The Mysore Economic Journal

JUNE 1920.

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The Mysore Economic Journal

A Monthly Periodical devoted to the Discussion
of all Economic Topics of Interest

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MYSORE ECONOMIC CONFERENCE.*

By Sirdar M. Kantaraja Urs,
B.A., C.S.I.,

Dewan of Mysore.

IT is my privilege to welcome you to this the Eleventh Session of the Economic Conference. We meet for the first time after the Conference has been re-organized and certain important changes have been made in its constitution. The Session of the Representative Assembly has just closed. Some of you are here as elected members of that Assembly. Being concerned with the general interests of the people, that body has to deal with many questions in common with you. The object of this Conference is to give you, as representing the most important economic interests in the State, an opportunity to bring to bear on your special subjects, your expert knowledge, practical ability and experience and help the Government and their officers in formulating a comprehensive policy.

The Conference, as first established, was intended to provide the State with an organization consisting of officials and non-officials interested in the economic development of the State, to study economic questions and frame schemes of improvement. There were three Central Committees consisting partly of members selected from the Economic Conference and others nominated by the President. The functions of these bodies were to be more or less advisory, though the Central Committees had authority to a certain extent to work out schemes experimentally. In the districts there were special committees consisting entirely of nominated members. In their eagerness to show practical results, both the General Conference and the Central Committees had, to a certain extent, swerved from their original advisory character, and there was in consequence considerable overlapping of functions and want of proper co-ordination between the several agencies.

The General Conference will henceforward not be concerned with any specific schemes of improvement. Meeting on the auspicious occasion of His Highness' Birthday, the public will, through its representatives, be taken once a year fully into confidence, as to the policy that will be adopted with regard to economic development in the State and given an opportunity to review the work done and make suggestions as to the lines of future development. The Central Boards will continue to work as permanent agencies, in close association with the departments concerned throughout the year, in

*Speech by Sirdar M. Kantaraja Urs, B.A., C.S.I., Dewan of Mysore, in opening the Eleventh Session of the Mysore Economic Conference, held on 1st June, 1920.

studying details of schemes and seeing that continuous attention is paid to questions of economic development.

WORK DONE DURING THE YEAR.

The reports of the work done by the Central Boards, the Departments concerned and the District agencies have been placed before you. The central organizations have shown considerable activity. In the districts, the first advance was made during the year towards effecting a transfer of the functions to local bodies and this has resulted in a certain amount of slackness during the process of transition.

The Department of Industries was engaged during the year in improving the Central and District Workshops, in developing the Soap, Metal and Weaving Factories and carrying on investigations into the possibilities of the manufacture of porcelain, chamois leather and glass. Besides furnishing advice on applications for loans for industrial enterprises, the most important schemes investigated by the Board of Industries are the revision of the rules relating to the grant of financial assistance to industries and the possibilities of certain mineral industries. The Board of Research devoted its attention during the year to the selection of problems relating to chemical industries in the State to be taken up immediately for investigation and the necessary preliminary arrangements to be made in that connection.

Two special committees were appointed during the year, one for working out the details of the scheme of an Industrial Investment and Development Fund sanctioned last year and the other for the further development and organization of the Mysore Bank in order to enable it to meet the demands of trade and industries in the State in a larger measure.

The Department of Agriculture has, in addition to a great deal of useful scientific work, carried on operations on a large scale for the supply of good seed, chiefly ragi and sugar-cane and improved ploughs and implements. It is also engaged in constructing a plough suited to local requirements. The purchase of an Austin Motor Plough with a view to test and demonstrate its utility to the ryots has been sanctioned. A Live Stock Expert has been appointed. It is proposed to organize special measures for the improvement of cattle and sheep breeding and dairying during the year.

In the Chemical Section of the Department, which is now under the direction of an Agricultural Chemist trained in Europe, important pot-culture experiments are being arranged for. The Senior Assistant Entomologist and the Senior Assistant Mycologist have been deputed for foreign training. Additional accommodation is being provided at the Hebbal School for opening Vernacular Classes in Agriculture. The Departmental staff is being suitably strengthened to facilitate demonstration and propagandistic work on a larger scale.

A Japanese Expert was engaged during the year for the improvement of Sericulture and the development of that industry both in regard to the increased production of cocoons and the better reeling and utilisation of the silk is receiving special attention.

The Agricultural Board has prepared final schemes for the relief of agricultural indebtedness in the Malnad, settlement of criminal tribes, increase of food cultivation, provision of land for the landless classes and the development of tea cultivation. Special measures were adopted during the year for the development of industrial and agricultural co-operation and for popularising the movement among the depressed classes.

In regard to Education, the year was mainly occupied in preparing the ground for carrying out the reforms embodied in the Education Memorandum. The Education Board besides devoting considerable attention to the examination of the proposals contained in the Memorandum and the revision

of the grant-in-aid Code, has dealt with the question of religious and moral education, the improvement of physical training, the provision of play-grounds and the systematisation of scholarships.

Though prices have been ruling high for some time past and the year was a remarkably prosperous one for agriculturists and some of the measures adopted by the Department such as introducing improved strains of ragi, sugar-cane and paddy and of improved implements are beginning to produce their favourable effects on the yields of crops, the condition of agriculture has nevertheless remained more or less stationary. With the exception of a few notable instances of individual enterprise, the State has not shared in the industrial awakening that has marked several other parts of India. Trade on the other hand due however to conditions common to the whole of our Peninsula shows improvement. There are signs of an increasing accumulation of capital chiefly in the hands of agriculturists and persons engaged in trade. With all these advantages, it is disappointing that the people, in spite of our efforts, should not have been able to derive much benefit from the present favourable conditions and the industries of the State have made no marked advancement. The question of the improvement of the Industries and Commerce Department so as to enable it to promote the development of industries and trade in the State more effectively and the means to be adopted for starting certain large industries for which the State possesses special facilities such as Sugar Factory, Cotton and Woollen Mills, Silk Filatures, Oil and Paper Mills are now under the consideration of Government.

WORK FOR THE FUTURE.

We are now passing through very critical times. There is a keen struggle throughout the world to re-adjust the whole social and industrial system to the new ideals and conditions resulting from the war. Every country is making strenuous efforts to stimulate its production and gain a leadership in trade, in order to be able to meet the enormous demands made upon its financial resources by the pressure of national debts and the need for rebuilding the entire national life on a better and more abiding foundation. How to increase the character and quality of our production so as to raise the general standard of wealth and the material condition of the workers and help the people to bear the burden of increasing prices, the best means of adjusting the demands of rural development with the urgent necessity for the increase of manufactures, how to deal with the important questions of finance, education, health and housing from the standpoint of sound social and economic progress, are problems that we are called upon to face equally with other countries and on our capacity to solve them depends the happiness and prosperity of the people.

I shall now refer to a few facts to show how vast the field is, that we have before us, for our own work and how easy it should be to show tangible results.

The total area of culturable waste in the State is more than 8,800,000 acres. Even as regards lands under cultivation not more than 10 to 15 per cent are cultivated up to the best standards known in the State itself. Large areas of land which are locked up as gomal and included in date groves, Amrit Mahal Kavals and other reserved areas can be made available for cultivation, if only the requirements for these purposes are carefully investigated and fixed on a proper basis.

The innate abilities of the people are allowed to run to waste for want of proper education. Nearly 94 per cent of the populaton is illiterate. The number of persons educated above the Lower Secondary stage forms less than one per cent of the whole population and the bulk of these have received only literary education. The number of skilled workmen is small. There are very

few persons who have been trained to handle machinery and still fewer, those who can organize or manage large business concerns.

There are large portions of our forests that are suited for growing commercial crops such as tea, coffee, rubber, camphor, etc., and other areas are available for starting timber and other plantations, which are now lying unutilised for lack of enterprise. The total number of concerns employing more than 5 persons is 70 and of persons employed directly or indirectly in industrial occupations is 1,55,877. The total number of Joint-stock companies in the State is 76. These have a total capital of about 75 lakhs of rupees. Of these companies, if we exclude such organizations as the Bank of Mysore, the two Cotton Mills, the remaining concerns are not of any great importance. The total rail-borne trade of the State including imports and exports is roughly 20 crores of rupees. There are not sufficient financial facilities for trade or industries on a large scale in the State.

The total value of raw materials now exported that may be utilised for industrial purposes within the State such as cotton, oil-seeds, hides and skins, silk and silk-waste, tanning materials, amounts to nearly 2½ crores of rupees. In addition to gold, minerals of the value of 2 lakhs of rupees are sent out of the State. Much of the mineral wealth of the country remains undeveloped. Our forest resources are neither adequately conserved nor utilised. Nor, in spite of the increasing scarcity of fuel and timber throughout the State have we taken any steps for the systematic growth of masses of trees for profit on waste lands and other unutilized areas. Though several parts of the State are suited for growing commercial crops such as sugar-cane, cotton, mulberry and tobacco, the area now occupied by these crops is less than 20 per cent of the lands suitable for such purposes.

The value of the crop produced on one acre of dry land in the State is about Rs. 15 and of wet land about Rs. 30. Comparing even within the State, the average yield of crops on the same class of land under the best methods of cultivation prevailing in the State is three to six times as great as under ordinary methods. The profits from agriculture alone could be easily doubled almost immediately even though the people follow their own old-established methods but pursue their occupations with greater intelligence and have more facilities to obtain capital. The minor industries are in a most primitive condition. Neither the number of workers nor their earning power shows any marked change from year to year nor are any attempts made to introduce new industries. The producers have no organization to market their products and are unable, unassisted, to profit from the high prices and introduce improvements in their handicrafts. Though there is great scope for such large industries as cotton, silk, paper, woollen and oil mills, sugar factories, manufacture of leather, essential oils, medical preparations, etc., and the State has much mineral wealth, water and other sources of cheap power supply, it has failed to take the lead given to it by its abundant material resources.

Owing to the large range and variety of subjects to be dealt with, the work of the Economic Conference has suffered from some discursiveness in the past. My object in repeating well-known facts on this occasion is to impress upon the departments and the agencies connected with the work of economic development, the great scope there is for framing their programmes in such a way as to be able to show immediate practical results. Now that the ground has been thoroughly cleared, our attention should hereafter be concentrated mostly on questions of immediate practical importance to the State and our efforts turned into directions that would enable us to show a steady advance from year to year.

FINANCING THE WORK.

Our chief problem with regard to our further development is one of finance. Our total expenditure on education 10 years ago was Rs. 10 lakhs; 5 years after, it rose to Rs. 15 lakhs. The present year's budget provides for an expenditure of Rs. 37 lakhs for the department and of Rs. 7 lakhs for the University. Similarly, the expenditure under the various heads comprising agriculture in the budget has risen during the past five years from Rs. 3½ lakhs to about Rs. 7½ lakhs.

A sum of 3 lakhs of rupees is spent by the department of Industries and Commerce to meet the cost of establishment, experimental and other work, in addition to the capital and revenue account of concerns worked by the department on commercial lines. A sum of one and one-sixth lakhs of rupees is spent by the department of Co-operation and of two lakhs of rupees by the Economic Conference and its several agencies. In round figures, we spend nearly 60 lakhs of rupees every year for the advancement of education and other measures relating to the economic development of the people. Having regard to our present financial resources, this forms a very liberal contribution out of our revenues and further addition can be provided only by increasing our resources. It is therefore incumbent on the departments and agencies concerned to regard the most advantageous investment on behalf of the people and while every freedom should be allowed to them for spending money for useful experiments and for educating the people, they should be bound to justify each item of expenditure by the results they are able to show in increasing the productive capacity and efficiency of the people. They should also realise that further increase of expenditure in the departments will be entirely determined by the additions they are able to make to the resources of the State and the success of their efforts in increasing the earning power of the people.

In conclusion, let me commend to you the following remarkable passage from a well-known authority on economics which aptly sums up the principles that should guide our work :—

"No utilisation of waste gases in the blast furnace can compare with the triumph of making work for the public good pleasurable *in itself and of stimulating men of all* classes to great endeavours by other means than that evidence of power which manifests itself by lavish expenditure. We need to foster fine work and fresh initiative by the warming breath of sympathy and appreciation of those who truly understand it; we need to turn *consumption into paths that strengthen* the consumer and call for the best qualities of those who provide for consumption. Recognising that some work must be done that is not ennobling, we must seek to apply the growing knowledge and material resources of the world to reduce such work within narrow limits and to extirpate all conditions of life which are in themselves debasing. There cannot be a great sudden improvement in man's conditions of life; for he forms them as much as they form him and he himself cannot change fast; but he must press on steadfastly towards the distant goal where the opportunities of a noble life may be accessible to all."

The report of the Bombay Industries department regarding the development of the dairy industry in India says that in dairying there is a distinct chemical side which awaits development. Buffalo milk yields a large quantity of fat and, after this has been removed, the separated milk can be used for the preparation of casein, and also milk sugar, the technical applications of casein being almost unlimited. The Casein Company of New York alone would monopolise all the casein produced in India.

AGRICULTURE IN THE PUNJAB, 1918-19.

By "Rusticus."

THE Report on the work of the Agricultural Department in the Punjab for 1918-19 is, for the first time, divided into two parts. The first of these contains the report of the Director, Mr. S. M. Jacob, I.C.S., and brief summaries of the work of the agricultural experts contributed by themselves. The second contains technical discussions and the data of the experimental work of the year. We propose briefly to reveiw the first part only as this alone contains far more matter than we have space to comment on. Mr. Jacob mentions that he has been limited to 20 pages. He has actually confined himself to 16 only. It would have been better if he had taken his full quota for he has condensed his report to such an extent that it suffers somewhat in lucidity.

Cotton and wheat are the two principal crops in the Punjab. The spread of American cotton in the Province, which is one of the outstanding achievements of the Agricultural Department in India, is due almost entirely to the efforts of two men, Mr. Milne, the Economic Botanist and Mr. Roberts, the Principal of the Lyallpur Agricultural College and Deputy Director of the Lyallpur Circle. Mr. Milne discovered the right type of American cotton and Mr. Roberts organized the auction sales which have done so much to induce the cultivator to grow it by securing for him the proper price for his produce. Between them, they have probably put as much money into the pockets of the Punjab cultivator as would pay the cost of the Provincial Agricultural Department several times over. Last year the estimated area under 4 F. was 511,000 acres, an increase of 120,000 acres on the previous year. The Indian Cotton Committee cautiously anticipated that there would be 465,000 acres under American cotton in the Punjab by 1920. It will be seen that this figure has already been surpassed, the reason being the rapid development of the Lower Bari Doab Canal colony which has now 235,000 acres under 4 F. or 85,000 acres above the Cotton Committee's figure. It is satisfactory to note that the advantages of sowing in lines are beginning to be appreciated both in that colony and elsewhere as this was one of the most important improvements in the cultivation of cotton suggested by the Cotton Committee. As regards the disposal of the produce, twelve auctions were held by the Agricultural Department and three by the Co-operative Department at which 120,000 maunds of cotton were disposed of at prices varying from Rs. 17-5-0 to Rs. 24-12-0 per maund. It might have been stated how this price compared with that ruling for the indigenous varieties. It is disappointing that the Co-operative Department has not been able to make greater progress in taking over the auctions from Agricultural Department, as it is very desirable in the interests of agricultural development generally that the latter Department should be relieved of this work. Mr. Roberts makes some interesting observations upon the future of these sales. He points out that, now that buyers are established at Lyallpur, auctions will be difficult to run successfully unless all growers support them. In recent years, in spite of the success of the auctions, only six or seven per cent of the crop has been disposed of by this means and it has, therefore, always been possible for established buyers to get plenty of cotton outside the auctions at cheaper rate. The best customers at the auctions have been new buyers. In the Montgomery Circle, that is in the Lower Bari Doab Colony, which is the newest of the canal colonies, auctions may be expected to find favour for some time to come but for the whole tract, Mr. Roberts considers that the ultimate

solution is to be found in co-operative sale in some form. Some of the larger growers in Montgomery have already combined to lease a factory in which to gin and press their own cotton but such a combination, unless it is very strong and can sell throughout the season, runs an appreciable risk in years of fluctuating prices. 4 F. by no means represents the last work in American cotton for the Punjab. The Indian Cotton Committee recommended that two other varieties, 280 F. and 285 F., should be given extensive trials. 285 F. is apparently proving a better cotton than 4 F. but has not yet passed the experimental stage as the Report mentions that it will be given extended trials on the agricultural station at Lyallpur. However, it is already being grown by some landholders who are satisfied that it is a better cotton than 4 F. 280 F. is being dropped as it has proved a lower yielder than 4 F. and has a smaller percentage of lint to the total outturn of seed and lint.

Punjab 11 continues to be the most popular of the varieties of wheat given out by the Agricultural Department in the Punjab. This is, we believe, a variety selected by Mr. Milne but the problem here was different from that in the case of cotton as this was the wheat which already constituted 80 per cent of the varieties existing in the canal colonies before the work of the Agricultural Department began to take effect. That work was, therefore, to substitute it for the mixed types previously prevalent. In 1918-19, Punjab 11 was grown on just over 300,000 acres and on the assumption that it gives one maund an acre more than the mixed varieties it replaced, this meant that the canal colonies produced 60,000 maunds more wheat than they would have done without the distribution of pure Punjab 11. The variety of wheat known as 8 A. has been extensively tested and appeared likely to prove a better wheat than Punjab 11 but, on the Lyallpur farm last year, the latter for the first time for four years beat it in point of outturn so that the problem stands where it did five years ago and further extended trials will be necessary before 8 A. can be recommended as an improvement on Punjab 11. The result of an investigation carried out by Mr. Milne into the milling and baking qualities of seven Punjab wheats, Pusa 12 and a mixed sample was that 8 B. headed the list closely followed by 8 A. with Pusa 12 last. These results differed greatly from those obtained in previous year by Mr. Humphreys, a well known authority, when 8 B. came first followed by Pusa 12, and they cannot, therefore, be regarded as final.

The Department has been so fully occupied with work on wheat and cotton that it has been able to do little for other crops. Some work has been done on dates, olives and potatoes but the cane crop, apart from tests of different varieties on the Gurdaspur farm, has received little attention though it is a crop of considerable importance in the Punjab. It need hardly be said that the reason is insufficiency of staff but this should soon disappear. The Agricultural College will, it would seem, shortly have a second Economic Botanist, a Professor of Rural Economics, a Soil Physicist, a Bacteriologist and an Agricultural Chemist. An Entomologist was added during the year. An increase in the number of Deputy Directors from three to six is also foreshadowed in the Financial Commissioner's review.

Mr. Jacob has been unable to translate the results of the work of the Agricultural Chemist on land reclamation, green manuring or nitrogen fixation into language which permits it to be understood by the layman and the only point which need be noticed in regard to it is that the Narwala farm of 130 acres which was reclaimed from saline efflorescence by the late Dr. Barnes and handed back to the owners after three years' work is showing signs of relapse though the efflorescence has so far only re-appeared in about two acres. The deterioration is

apparently due to the fact that the land has *not been given water in anything like the* quantity used by Dr. Barnes. Mr. Jacob remarks that it will be interesting to see whether deterioration will continue if only a normal water-supply is given to the land. What is an interesting case to the doctor does not always present itself in the same light *to the patient and anxiety rather than* interest will, we imagine, be the prodominant feeling in the minds of the owners of the farm.

As was the case throughout India, the sale of imported agricultural implements in the Punjab received a severe set back in 1918-19 owing to the rise in prices. 396 only were sold against 1,863 in 1916-17. However, about 750 implements, mostly bar harrows, drills and Lyallpur hoes, manufactured by the Department itself were disposed of in addition. The material of the bar harrows alone costs Rs. 12 apart from the cost of manufacture but they are sold at Rs. 10 so that it is not surprising that they are popular. Mr. Jacob proposes to raise the price as soon as they are well established. This is obviously the correct course as it is desirable that the private manufacturer should be encouraged to enter the market.

It is not so many years since there was not a single student in the first year's course at the Lyallpur College. Last year there were 265 applications for admission to 56 vacant places and for the first time the applications from agriculturists exceeded those from other classes. This is all to the good and it is even better that the demand for the services of the men who have passed through the College should exceed the supply as this is the best possible evidence that the men turned out is satisfactory. It would have been of interest to know how large a proportion of the men who have been trained at the College are managing their own lands. In addition to the regular college course of four years' duration, numerons other courses are held at the College, a Vernacular course taken by 32 students, a rural economy class *attended by 13* Revenue and Irrigation officers and a short farmers' course of ten days' duration at which the main subject of instruction was the handling of the implements turned out at the farm. The College is, therefore, as it should be, the centre of the agricultural life of the Province.

There is much else in the Report, notably the discussion on the value of demonstration farms, on which we should have liked to comment, did considerations of space permit. We are glad to see that the work of issuing crop forecasts has been taken over by the Agricultural Department from the Department of Land Records. A word must be said in conclusion about the most interesting experiments in making a rapid crop survey by means of aeroplane photography. A series of photographs of an area under crops in a village five miles south of Lahore was taken from heights varying from 3,000 to 13,000 feet but unfortunately the cameras used were not of the best type. Even so, it was found that crops of cane were perfectly distinguishable at 10,000 feet. At that height senji (a fodder crop) and wheat were often similar in shading but the fields of senji could frequently be distinguished owing to the irregular patches where the crop had been cut for fodder. Gram was too thin and struggling to be very different from a field of fallow. A fresh series of photographs with better cameras is being arranged for. Cane, cotton and wheat are the principal crops and cotton and cane present no difficulties. Wheat does but Mr. Jacob is hopeful that these will be overcome. If this proves possible, Mr. Jacob holds that a series of aeroplane photographs will give a basis for forecasts of the areas under each crop which could not be surpassed. The experiment certainly furnishes evidence of what is apparent throughout the report that the Punjab Agricultural Department is keeping abreast of the times.

INDIAN CURRENCY AND BANKING.

BY PROF. V. G. KALE, M.A.

MR. G. Findlay Shirras is too well-known to the reading public as Director of Statistics with the Government of India, to require any introduction. In that official capacity, he has introduced a number of important improvements in the method of presenting statistics to the public from year to year. The reports, reviews and statements which he has been publishing, have become instructive to those who are interested in a study of statistics relating to the economic development of India. Like the few officials who are not content with the mere routine of their departments but love to go bebind the facts and the figures they have to handle, Mr. Shirras has laid down the practice of interpreting his statistics and placing them before the public in such a way that a similar interpretation may be facilitated in their case also. Officials like him have this advantge of securing access to facts and figures which are not easily available to the ordinary student. We note that Mr. Shirras was a reader of Indian Finance and Currency in the University of Calcutta in 1914, and remember having read newspaper reports of the lectures he delivered in that connection on Indian banking. We then thought that a book from his pen on those subjects, would prove valuable and we are glad that he has produced a volume* on Indian Finance and Banking for public benefit. Mr. Shirras has written the book, of course, in a non-official capacity and the views expressed by him are in no way, official views. Indian Currency is a large subject, not easy to handle, but with his large experience and acknowledged capacity, Mr. Shirras was expected to tackle it with success. And the expectation has not been disappointed.

Indian finance, currency and banking have been recently undergoing such rapid and far-reaching changes that a book on those subjects must get out of date in the course of a single year. Mr. Shirras, however, had this advantage that he wrote the volume under review after the country had gone through the most extraordinary experience of war conditions, though the Babington Smith Committee's report was not available to him and the peculiar conditions which have led to the sale of reverse councils on a large scale during the past four months in the face of strong public opposition, had not then arisen. But Mr. Shirras's book does much more than giving an account of the leading events which occurred in the realm of Indian finance and currency during the time of war and pointing out their significance in the way of their far-reaching effects. The historical portion of the book and the discussion of fundamental principles and practices underlying the Indian system of finance and banking is not the least instructive part of the volume. It carries forward the work done for students by Prof. Key, and Mr. H. F. Howard and executes the task in a more comprehensive and thorough-going manner.

Beginning in the introductory chapter with a brief exposition of the main features of India's balance of trade, the book proceeds to describe the country's currency system as it existed before the war. This introduction prepares the reader for an account of the way in which the system was affected by war conditions. The years of war fall into two well-marked periods, the first from 1914 to 1915, and the second from 1915 to 1919. The description of the developments which took place in the second period, leads the author to a discussion of some highly interesting questions such as the fixing of the exchange and the suitable rate for the same.

* *Indian Finance and Banking* by G. Findlay Shirras, Macmillan & Co. Ltd. Price Rs. 18.

Mr. Shirras examines the various proposals that have been made to stabilize the rupee for instance, fixing it at a low rate and facing temporary inconvertibility to maintain it in emergencies. He is strongly opposed to inconvertibility as being 'altogether outside practical politics in India' as he is opposed to the 'debasement' of the rupee and he thus anticipates the verdict of the Currency Committee in that regard. The lessons that he derives from the experience of war time are (1) the value of liquid gold in reserves, (2) the importance of imports of treasure, especially gold, in the liquidation of India's favourable trade balance, and (3) the necessity of large rupee balances to meet abnormal strain and they are important lessons that must be taken to heart.

Mr. Shirras feels satisfied that the Indian currency system has been developed, on the whole, on right lines and that much of the criticism passed against it, is unjustified. He regards India's gold exchange standard as 'an improved gold standard' and has no patience with those critics who, like Professor Nicholson, are inclined to think that it is an imperfect standard, or in fact, is no standard at all. Security and elasticity are two attributes of an ideal currency and the Indian system, according to Mr. Shirras possesses them in a large measure as was proved by the experience of the war period. Mr. Shirras' characterization of the view of hostile critics as misleading and mischievous, leaves us unrepentent. He and those who think with him, would father upon India an 'ideal' and 'improved' system despite the peculiar conditions which prevail in this country, militating against the adoption of the exchange standard. The large favourable trade balance that India has from year to year, the demand of her people for gold in large quantities for social and other uses, the ignorance and other backwardness of the masses are factors which have to be taken into account in pronouncing upon this question. Free trade is an ideal thing, but India does not want it and even England is trying to abandon it. Bimetallism is an ideal system, but England has never favoured it. Systems may be ideal but they must be suited to a country's economic, social and political conditions. Mr. Shirras complains of India's heavy absorption of gold but the currency committee has shown a better appreciation of the causes and the value of this phenomenon. The world wants India's raw materials even at high prices and cannot make full payment for them in commodities. And the balance has to be remitted in the form of the precious metals as it cannot be accumulated abroad beyond a certain limit. There is no escape from this position and the exchange standard far from providing a remedy, aggravates the difficulty. In a later chapter, Mr. Shirras observes as follows concerning the position of gold in the Indian currency :—"The most suitable media for internal circulation are rupees and notes, especially the latter; for the settlement of our external obligations, we should turn to mobilise gold reserves, by means of which so much of the internal currency that seeks export may be converted quickly and without difficulty into sterling." And he quotes with approval Mr. D. M. Dalal's remarks made in March, 1919, concerning the conservation of gold in India. Little did Mr. Shirras dream of the severe strictures that Mr. Dalal has passed against the gold exchange standard policy of government during the war period !

We cannot commend too highly the author's narration of the history of Indian currency through the different periods and his most illuminating chapters devoted to the exposition of the paper currency, the gold Standard Reserve, council drafts and the balances of the Indian Government. Equally instructive is his account of the Indian banking system in all its aspects and the effects of the war upon the position of the banks. The requirements of the immediate

future with respect to sound and extensive banking in the interests of the rapid economic development of the country, have been clearly shown and the situation in India is compared with that of other countries. The numerous statistical tables which have been introduced into the body of the book are exceedingly helpful in illustrating and driving home the points sought to be made by the author. The tables appended at the close of the volume supply valuable material to the student not only in regard to Indian currency and banking but the general economic condition of the country—a setting which makes the main features of the picture highly vivid and impressive. Mr. Shirras has produced a book which will be found to be eminently suited to the needs of the student who wants other highly technical subjects of Indian currency and banking treated in an instructive and easily intelligible way. The book may be profitably studied by the general reader and may be used by University students as a text-book. It fulfills both these requirements in a remarkable manner and we congratulate Mr. Shirras on having satisfied a badly felt want.

The introduction and maintenance of the best strains of cotton was one of the most valuable activities of the Bombay Agricultural Department during 1918-19, and the growing of selected strains and the distribution of seed through selected agencies continued. H. E. the Governor in Council in their Resolution on the Report of the Department, observes with satisfaction the efforts made in Gujarat to combat the spread of inferior cotton and the threatened extinction of the best Broach varieties. A special staff has been appointed to carry out these operations, and it is satisfactory that the trade has lent its support and co-operation which, it is hoped, will continue.

EMPIRE COTTON.*

ON the 25th July, 1917, a Committee, under the chairmanship of Sir Henry Birchenough, Bart., K. C. M. G., was appointed by the President of the Board of Trade to "investigate the best means of developing the growing of cotton within the Empire, and to advise the Government as to the necessary measures to be taken for this purpose." It was a strong and representative Committee, consisting of twenty-one members appointed by the Board of Trade; seventeen of the members were nominated by Government Departments, trade associations, and other public bodies. The recommendation that the Empire Cotton Growing Committee should be set up was made by the Departmental Committee on the Textile Trades, and this recommendation was supported by a Memorandum to the Prime Minister from the British Cotton Growing Association and other bodies, including the Liverpool and Manchester Cotton Associations, and all the Associations of employers and employed in the cotton Industry.

It was pointed out that (1) The world is short of cotton, and the shortage is increasing. (2) The shortage is greatest in the finer kinds of cotton which Great Britain uses so largely, and is generally more serious for Great Britain than for any other country. (3) Eighty-five per cent of the cotton used in Great Britain comes from the United States, which every year itself consumes more of its own cotton. (4) The British Empire can (with proper development) grow the quantity and quality of cotton that it requires. (5) Cotton growing brings prosperity to the places suited for it.

It was also suggested that there was a wide sphere of work which needed to be done by someone, and which could only be done

*With acknowledgments to the *Board of Trade Journal*.

quickly with Government assistance. It was argued that it was the business of each Colony or Protectorate to decide for itself whether its climate, soil, population and means of access to markets were suitable for cotton; also that it was the business of each Colony to decide what kind of cotton it was most profitable to grow, to try experiments, to control the industry, and to provide the necessary transport and other facilities when cotton was shown to be profitable to the Colony. Finally, it was suggested that great advantages would arise from the creation of some kind of Central Committee or Department in the Imperial Government to advise and assist in connection with all measures which had to be taken, and in particular, to bring all the resources of science into play to promote the extension and improvement of cotton growing.

THE GENERAL SITUATION.

All the investigations that the Committee have made tend to confirm the statements made in this Memorandum. There is no doubt about the shortage of cotton, nor as to its importance to Great Britain and the British Empire. Since July, 1917, the situation has become decidedly worse. Owing in part to the necessity for growing more food stuffs to meet the needs of the war, the cotton crops in the United States, in Egypt and in India have been curtailed. Moreover, the seasons have been unfavourable, and the present season is giving rise to fears that the crops both in the United States and in Egypt will again be deficient. The advent of peace has in no way improved the situation. There is evidence of a world shortage of cotton goods, and there is no prospect whatever of there being a full supply of cotton for some years to come. Prices of cotton are already at levels far in excess of anything recorded since the cotton famine in the sixties. The Committee also find themselves able to endorse generally the opinions in the Memorandum. They are confident that if proper measures are taken, it should be possible to grow within the Empire at any rate a very large proportion of the cotton it requires. They are convinced that in many parts of the Empire cotton growing will greatly increase the prosperity of the colonies which grow it. As will be seen in Part II, this has already happened in St. Vincent and in Montserrat, and is taking place to a remarkable degree in Uganda. Further, they concur generally in the suggestions made in the Memorandum, and think it very necessary that the Committee should be empowered to advise and assist in all measures to be taken for the promotion of cotton growing.

The Report of the Empire Cotton Enquiry Committee which has now been issued (Cmd. 523, 1*s.* 6*d.* net) is in two parts, Part I giving the general views of the Committee, and setting forth their general plans and proposals for the future; Part II containing a detailed survey of the various territories of the Empire which are considered suitable for the cultivation of cotton.

PART I.

THE PROBLEM TO BE SOLVED.

The problem before the Committee was the adequate development of the Empire's resources for the production of cotton. Its solution appears to depend on the proper handling of three main questions.

I. The acquisition of necessary knowledge, and the supply of men to apply that knowledge.

II. The establishment of efficient arrangements for (*a*) controlling the growing of cotton crops, and (*b*) marketing the crops, when grown, so as to secure the best possible results for the growers.

III. The provision of the necessary funds.

THE ACQUISITION OF KNOWLEDGE: A CENTRAL RESEARCH INSTITUTE.

It is urged that the foundation of all agricultural progress must be based on science. Research is required not only into the true relation between the characteristics of cotton lint and the qualities of the finished article, but is also urgently needed into the principle underlying the growth of cotton. Two branches of research are required; one into the laws of heredity and their application to the development of cotton: the other into the effects and limitations of environment. Again, the research needed can be divided into two classes in another way, for some problems are of a universal character, and some are purely local.

To carry out the research required it is recommended that at the earliest possible date a Central Institute should be established to study the life of the cotton plant and the development of its lint, from all aspects except such as are of merely local interest and profit. It is suggested that for many reasons Egypt would be the most convenient place for the proposed Institute, provided that it would be welcomed by the Egyptian Government. It would not deal with local Egyptian problems, but would be closely linked up, not only with the local research work of Egypt, but also with the local research work of all other cotton areas. Co-operation with the newly formed British Cotton Industry Research Association is intended, and a Joint Committee has already been appointed.

THE APPLICATION OF KNOWLEDGE.

Very great emphasis is laid on the need for making great additions to the Agricultural Departments of all British Colonies and Dependencies, particularly where cotton can be grown. The Committee have great pleasure in reporting that the Colonial office has recently, on their recommendation, appointed a Committee (1) to consider the question of Agricultural Departments in the territories for which it is responsible, and (2) to draw up a general scale of numbers of men and of suitable salaries which could be adopted as an ideal to be worked up to as finances permit and as the men can be found. The need for pioneer work is discussed. The work of the British Cotton Growing Association since 1904 is suitably ackowledged, and it is pointed out that work of this kind, that is investigations as to the prospects for cotton in fresh districts, will require to be continued for many years to come.

SCARCITY OF MEN.

This is a very important subject, and the inquiry shows that the available supply of trained men is entirely insufficient. Three classes at least are required. Men outstanding of ability to conduct pure Research, men of good scientific qualifications for direct investigations, and practical men for pioneer work and for bringing influence to bear on ordinary agriculturists. These classes are additional to administrative and executive officers necessary to secure proper control of the cotton crops under the regulations laid down by the local authority. In view of the need for so many highly trained men the Committee point out that there is a preliminary need to be supplied, and that they are advised by competent witnesses that provision must be made for more pure Research to be done at British Universities and other places in such subjects as Plant Physiology, Plant Genetics, Mycology, and Entomology. At least one Professorship or Readership in each of these sciences should be provided. In addition, provision should be made for a number of post-graduate studentships attached to these and other chairs, by means of which promising men can be trained in methods of Research. The Committee have made a small beginning by having arranged with the British Cotton Industry Research Association to co-operate in offering five such studentships to be held in the coming year. The Committee recommend His Majesty's Government to take this matter into serious

consideration in consultation with the cotton industry and many others which depend on agricultural products for their raw materials, and they also recommend that liberal contributions for this purpose should be recognised as part of the expense of increasing the cotton supply.

BUREAU OF INFORMATION.

The need is explained for a Central Bureau of information to collect and disseminate the knowledge of all matters of interest to scientific and other cotton growers. It is hoped to arrange for the publication of a Quarterly Review of Cotton Growing.

THE CONTROL OF COTTON GROWING.

The necessity is explained for strict control by Government of all cotton crops so as to secure purity of strain, which is recognised to be an essential condition of success in cotton growing. Control is wanted in other ways to combat pests which, everywhere injurious, are specially dangerous in tropical regions.

THE MARKETING OF COTTON CROPS.

The Committee explain that in the infancy of cotton development in any new district special arrangements are necessary to secure to the grower prices proportionate to the quality of his cotton. It is also pointed out that financial assistance must occasionally be afforded during the period of growing. This may sometimes take the form of fixing prices ahead, in others it may be necessary to make monetary advances against the crop. For all such work it is felt that some agency independent of Government will be needed, and it is recommended that an agreement should be made with the British Cotton Growing Association, subject to that body foregoing commercial profits and being guaranteed against loss on this part of the business.

PROVISION OF THE NECESSARY FUNDS.

It is in tbe first place pointed out that apart from the large capital required every year to finance and market the crop, promotion of cotton growing will involve the expenditure of a good deal of money. Some forms of expenditure have already been indicated. There are also many other matters often of pressing importance for which a large amount of money will eventually be required. The great need in almost every Colony or Protectorate is for better transport facilities. Roads, railways, water communications and harbour works are almost everywhere demanded. There are also in many places present or prospective needs for irrigation and drainage.

ALLOCATION OF FINANCIAL RESPONSIBILITY.

The Committee state the broad principle which in their opinion should be recognised in allocating the responsibility for raising the necessary money. They recognize the claims on the Imperial Government for assistance to the Colonies in raising money for development purposes; they also feel that a strong case can be made for appealing to the British Treasury for support to be given in some proportion to the efforts made by the Cotton Industry itself to pay for the unremunerative work which will be necessary to secure the satisfactory supply of its raw material. But the immediate object of the paragraph must be stated in extenso; it runs:—"At present our object is to distinguish between the responsibilities for expenditure on the part of the cotton growing colonies, and the cotton using industries, and to establish the principle that while expenditure which directly benefits the general interests of a colony should be borne by the colony itself, the cost of promoting the cultivation of cotton in preference to othes crops should be recognised as a charge on the Cotton Industry. We hope that thir broad principle may find general acceptance in Lancashire and other cotton using districts. There will, of course, be many cases in which the exact application of a principle of this kind may be in doubt. In some

countries cotton is the most paying produce it is possible to grow, in others it is barely able to compete with other crops. Some colonies are better able to finance their own developments than others. In the poorer colonies, if cotton is to be developed at all, assistance must be given from the outside. Further, if the principle we have enunciated is accepted, we feel that it will be fair to urge that wherever the Cotton Industry is willing to make special efforts to promote cotton growing with the approval of this Committee, the local Government concerned should upon its side do all that it possibly can to provide sufficient means of transport and communication and other necessary adjuncts."

FINANCIAL REQUIREMENTS OF THE EMPIRE COTTON GROWING COMMITTEE.

These cannot as yet be accurately estimated. An annual income is required for establishment expenses, and for a small amount of preliminary work. In addition the following beadings are suggested which have already been partly explained.

(i) Research Work.—For the Central Institute for Research it is suggested that it might begin with four men of science with the necessary European and native assistance, and with at least four younger men qualified for carrying on independent research under supervision. It is mentioned that the funds for this can either be provided by the Empire Cotton Growing Committee, or by the Cotton Industry Research Association. Both bodies are in an early stage of development, and friendly discussion will be required. But in any case very considerable expenditure is required, and will certainly bear fruit in largely increasing the wealth of the Empire.

(ii) Readerships and Studentships.—It is recognised that this matter concerns not cotton alone, but most of the other textile trades, and many othes industries, such as sugar, rubber and cocoa, which depend on the living plant. The Committee recommend that the Cotton Industry should include this form of expenditure in its provision of funds for cotton growing.

(iii) Practical Agricultural Work.—It is thought, that, as the Agricultural Departments of many of the Colonies or Dependencies are enlarged, it will be necessary for the Cotton Industry to finance wholly, or in part, men who are employed in the special promotion of cotton growing.

(iv) Pioneer Work will be required, and is a proper charge on the Cotton Industry.

(v) Commercial Handling will involve very considerable outlay.

(vi) Information.—Provision must be made for the necessary expenditure.

METHODS OF RAISING THE MONEY.

It is pointed out that the necessary funds cannot be satisfactorily raised by appealing for gifts and voluntary subscriptions; nor is the kind of expenditure required such as to offer any direct profits in return. The expenditure will yield profitable results, but they will accrue to the cotton growing and cotton using communities, and not to individuals. It is, therefore, suggested that a fund should be raised on the basis of some kind of a levy from the Cotton Industry. A possible plan would be to impose a small sum on all cotton imported into the United Kingdom. So small a sum as 6*d*. per bale of 500 lb would raise £100,000 per annum. Whatever plan is adopted and whatever sum is found to be necessary, it will be trifling beside the interests involved. Great Britain uses annually about 4,000,000 bales of cotton, valued at the present time at £150,000,000 and upwards. It is recognised that elasticity will be required so that the sum annually provided may correspond with the expenditure which can from time to time be justified; and also that so far as the industry provides funds the representatives of the bodies which find it must control its appropriation.

FUTURE PROSPECTS.

Part I closes with an expression of the Committee's confidence that the problem of Empire Cotton Growing can be solved. Further and more detailed enquiry will be needed; persistent and scientifically instructed work must be done; but success may be confidently expected.

GENERAL CONCLUSIONS AND RECOMMENDATIONS.

The General Conclusions and Recommendations of the Committee are as follows:—

In putting forward our conclusions and recommendations we have to admit that they are to a large extent provisional in their character. We are convinced that it is possible for the British Empire to make good the world's shortage of cotton, but the one conclusion that stands out plainly and definitely as the result of our work during the past two years is that this achievement is beyond the powers of this or indeed of any Committee. It can only be accomplished by the united efforts of the Imperial Government and the Government of the cotton-growing Dominions, Colonies, and Protectorates, supported by the active interest and cordial co-operation of all who are engaged in the Cotton Industry in this country.

Our general recommendations are as follows:—

(1) That the Empire Cotton Growing Committee be authorised to continue its work on the general lines of the present Report, and that a grant be made to it by the Treasury of a sum of not less than £10,000 per annum for five years to pay for its secretarial and other current expenses and for any outlay that proves to be necessary for initiatory work in directions connected with the objects of tbe Committee.

(2) That the immediate importance of greatly enlarging and strengthening the Agricultural Departments of British Colonies and Protectorates be recognised as a preliminary step essential to any rapid progress, and that the Colonial office be respectfully recommended to appoint a committee to advise on the scale of numbers, salaries, and general expenditure which should be aimed at for adoption as and where circumstances permit.

(3) That, in order to supplement the present knowledge of scientific principles underlying cotton growing, a Central Research Institute be established as soon as possible for their investigation.

(4) That, in order to increase the supply and improve the training of scientific men, financial provision be made for at least four Readerships at British Universities in Plant Physiology, Plant Genetics, Mycology, and Entomology; that funds be provided for the awarding of Research Studentships to be held for one or two years by graduates who are selected for training in methods of research in these and other sciences concerned with the study of the living plant; the number of these to be five to begin with, but to be gradually and considerably increasing before long.

(5) That we should establish a Bureau for the interchange of knowledge of cotton growing and should arrange for the publication of a Quarterly Review devoted to this subject.

(6) That the Governments of all cotton-growing areas in the Empire be advised to take full powers for exercising strict control over all

essential matters connected with cotton growing.

(7) That, where it is possible and seems desirable, such Governments be recommended to establish local Associations of cotton growers to advise their Government upon matters of general interest to the industry.

(8) That an agreement should be negotiated with the British Cotton Growing Association, in accordance with which that body will act as agent for the Empire Cotton Growing Committee for marketing crops where this is desired by the local Government; that it should be a condition of this agreement that the British Cotton Growing Association shall forego the appropriation of any profits made in the business carried on under the agreement, provided that the Association is guaranteed against permanent loss arising therefrom.

(9) Finance.—That funds for the promotion of cotton growing in the Empire should be provided from the following sources:—

(a) The British Treasury.

(b) The local revenues of cotton-growing areas.

(c) The Cotton Industry.

That the following general principles be accepted as a guide in discussion and in negotiations as to the allocation of financial responsibility to each of the above sources:—

(a) That the British Treasury may fairly be looked to—

(1) To provide for the secretarial and establishment charges of the Empire Cotton Growing Committee, and for outlay for initiatory work in directions connected with the objects of the Committee.

(2) To contribute—in some proportion to be agreed—towards expenditure upon schemes approved by this Committee which have for their object the provision of the raw material upon which the great national industry of cotton manufacture depends.

(4) To assist the Governments of Colonies and Protectorates—either by grants or more probably by guarantees—to provide funds for public works, such as railways, waterways, irrigation and harbour works, necessary for the development of their resources.

(b) That where developments, although in their inception they may be connected with cotton growing, are calculated to extend the general prosperity of a Colony or Protectorate, they should as a rule be financed by the Colonial or Protectorate Government.

(c) That where the growing of cotton is promoted in preference to other profitable crops, and where pioneer work is undertaken in order to ascertain whether cotton can be grown profitably, the consequential expenditure should be at the charge of the Cotton Industry.

(10) That the Committee be authorised to ascertain the opinion of the Cotton Trade of this country in regard to these recommendations, and in particular upon what lines effective co-operation in raising

the necessary money may be expected from the organizations in which the trade is grouped.

PART II.

SURVEY OF THE COTTON GROWING AREAS OF THE EMPIRE.

The Summary of Special Conclusions and Recommendations is as follows :—

WEST INDIES.

The crop, though small, is of world importance. We recommend that means should be provided to secure the continuance and, if possible, some enlargement of the Imperial Department of Agriculture. We also recommend that careful enquiry be made as to the best means of replacing the Sea Island crop of the United States [which is in grave danger of practical extinction].

EGYPT.

(a) The Egyptian crop before the war had reached a total of over 7½ million kantars (or 1,875,000 bales of 400 lb.). It has, however, during the war, fallen below 5 million kantars. Having in mind this fact and the particularly serious reduction in the supply of fine cotton generally owing to the loss of the Florida and Georgia (Sea Island) crop, we regard the position in Egypt with peculiar anxiety, and desire to emphasise the necessity of leaving no step untaken to remedy the causes which have led to this decline and to attain the maximum production of which the country is capable.

(b) As quality is of first importance in fine cottons, such as Egyptian, we consider it essential that work should be directed methodically and constantly, not only towards maintaining the quality of the existing varieties, but also towards securing and holding in reserve other varieties for introduction when and as expedient.

(c) We would specially emphasise the desirability of proceeding without delay with the measures already determined upon before the war to remedy the unsatisfactory condition of parts of the Delta as regards drainage and the control of excess water.

(d) Concurrently with the completion of these projects, it is of the utmost importance that water should be available for the reclamation and irrigation of the lands referred to as well as of those further north which will be restored to cultivation by the new drainage works. An adequate water-supply is available in the White Nile, and we trust that no time will be lost before adopting the best measures for its utilization. Until this is done full advantage of the expenditure already incurred in the Northern Delta cannot be obtained.

(e) It is estimated that the measures referred to in paragraph (d) would result in an increase of 3,500,000 kantars of cotton, or about 900,000 bales of 400 lb. The magnitude of such a possible increase in the Egyptian crop overshadows, though in no way detracts from, the importance of the prospective increase in Uganda or Nigeria, where some such figure as 100,000 bales may be expected as the result of development work.

(f) Since part of the serious reduction in the average yield of the crop is due to the devastations of the pink boll worm, we consider it essential that no time should be lost in putting into force the measures decided upon just before the outbreak of war to combat the ravages of this pest.

(g) We most cordially welcome the appointment of the new Cotton Research Board in Egypt and hope that every assistance will be given to it and to its endeavours to elucidate the problems affecting the Egyptian cotton crop, in particular (a) the environment of the crop, specially with regard to water and to the control of insect pests, and (b) the maintenance and improvement of the quality of the seed.

SUDAN.

In our letters to the President of the Board of Trade dated 29th December, 1917,

and 17th February, 1919, we referred to the importance to Egypt of the Sudan irrigation and accompanying drainage schemes; and we desire to emphasise once more the fact that the irrigation projects in the Sudan form an inseparable part of the comprehensive scheme for utilising to the fullest extent the water supplied by the Nile.

We have heard very full evidence with regard to the Blue Nile Barrage, which would make possible the irrigation of some 300,000 acres of land as a first instalment in the Gezira, with prospects of a further increase to about 1,000,000 acres suitable for cotton growing. We are of opinion that the Gezira is one of the most promising districts for development that we have had to consider; we recognize, however, that, with regard to the utilization of the Nile, the interests of Egypt have to be considered before those of the Sudan. At the same time we hope that the possibilities of opening up and developing the Tokar and Kassala areas may be carefully considered.

In the Sudan as elsewhere, we consider experimental work to be of the greatest importance. We are glad to be informed that this is fully recognized by those responsible for the Government of this important country.

MESOPOTAMIA.

We are of opinion that the results obtained by the experimental work of the Department of Agriculture are very promising. These experiments, however, were necessarily carried out on a small scale. It is, therefore, most important that the work should be continued and extended in order to determine whether cotton can be economically produced on a commercial basis. It is essential for this purpose that arrangements should be made to build up a supply of approved seed for large sowings in 1921, and we have already recommended that the funds required to make this possible should be at once provided by a special grant.

UGANDA.

We recommend that the Agricultural Department should be enlarged, and that the salaries paid to its officers should be substantially increased, so as to retain those already employed, and to attract men of ability to the service.

Continued attention should de paid to the development of transport facilities, including improved waterways.

We recommend that Government control of the Cotton Industry already established should be maintained.

NYASALAND.

We wish to emphasise the necessity here as elsewhere in Africa, of strengthening the Agricultural Departments and improving transport facilities.

RHODESIA.

We think it desirable that the possibilities of Rhodesia as a whole should be more fully explored, since, although none of the districts where pioneer work has been undertaken can be regarded as likely to produce a large cotton crop in the early future, they apparently possess possibilities for further development which may prove valuable later on.

The addition of cotton experts to the otherwise well-equipped Agricultural Department is essential before progress can be expected.

THE UNION OF SOUTH AFRICA.

The cotton-growing industry has now emerged from the experimental stage in South Africa. The results obtained indicate that cotton of excellent quality can be grown. We recommend that the valuable work done by the Department of Agriculture should be extended with the object of developing cotton growing on a much larger scale.

NIGERIA.

We see reason for hope that great expansion may be possible in the growing of cotton in Nigeria, but before this can be attained a large increase in the staffs of the Agricultural

Departments will be necessary. We have to reiterate once more the need for an increase in the salaries paid, if these Departments are to be maintained in an efficient state.

We are of opinion that progress equally depends upon the systematic development of the transport systems. Until main line railways can be constructed, we think that efforts should be made to open up the country by other means of transport. We understand that several methods have been tried, and we would press the authorities to decide upon those most suited to local conditions.

We are of opinion that the work of the British Cotton Growing Association in promoting the commercial development of the cotton crop has been very valuable.

Meanwhile, we recommend that the British Cotton Growing Association be asked to proceed energetically with its work in the areas in which it is now operating, with a view to increasing the cotton crop to the fullest extent of the capacity of the ginning and baling plant already installed, which appears sufficient to deal with a large increase upon the output of recent years. In this connection we recommend that our Committee should enter into a working agreement with the Association as outlined in Section 26 of this Report.

Exploratory work in new districts, for example, in the region of Lake Chad, appears to us desirable, and we recommend that we should assist the local Government in pioneer work.

INDIA.

Following the recommendations of the Indian Cotton Committee, which sat in 1917-18, we advise :—

(i) That in order to obtain permanent improvements in cotton in India on a commercial scale, more detailed agricultural work, better methods of marketing and handling, and closer co-operation between the Agricultural Departments and the Cotton Trade interests should all be promoted

(ii) That more detailed investigations of the existing kinds of plants in cotton-growing areas and more systematic tests of different varieties should be made. The work, both of selection and plant breeding, should be conducted solely "by research officers specially qualified therefor and able to devote their full attention to it." The methods of field tests should be systematised.

(iii) That special weight be given to (1) the importance of work directed towards the improvement of agricultural practice in its widest sense ; (2) the need of staffing, organizing and equipping Agricultural Departments on a scale adequate to carry through wide-spread demonstration work ; (3) the vital necessity of Government control in organizing the selection, supply and distribution of pure seed.

(iv) That the recommendations to appoint an additional mycologist and to discontinue work on perennial cottons be adopted.

(v) That the increase asked for in the staff of the Agricultural Departments, which is the minimum that can be expected to discharge the necessary duties assigned to these officers, should be granted.

(vi) That the possibilities of the Sukkar Barrage Project be re-examined.

(vii) That, with a view to improving the marketing of cotton, markets should be established under definite rules and regulations, and co-operative sale by the villagers should be encouraged.

(viii) That effect be given to the Indian Cotton Committee's suggestions for the licensing of ginneries and presses, and that the needful legislation be introduced. We also support their recommendation that the transport of cotton and waste be controlled.

(ix) That the proposal to form an East Indian Cotton Association be carried out, since we believe that the formation of an association on the lines indicated would be of benefit to the Indian Cotton Trade, and would be welcomed by similar organizations in other countries.

(x) That the standardization of weights on the plan suggested—namely, 28 lb. (avoird.) to the maund, 28 maunds to the khandi—be adopted.

(xi) That the recommendations for improving crop forecasts be carried out, but that in the interest of accuracy the advisability of securing returns of unpressed cotton delivered direct to mills be considered.

(xii) That the proposal to form a Central Cotton Committee, as outlined in the Report, be put into effect, and that the Empire Cotton Growing Committee work in co-operation with it wherever possible, in the interests of cotton production.

Finally, we would request sympathetic consideration for, and early action on, the various recommendations of the Indian Cotton Committee, which we consider well calculated, both to improve cotton growing in India and to promote the material benefit of that country.

The report was dated on 22nd October, 1919, and is signed by all the members of the Committee except Mr. Wadia and Mr. Kershaw, who have been absent from England during the drafting of the Report.

COMMERCE AND INDUSTRIES IN INDIAN STATES.

BY A. P. SMITH.

THE necessity for the expansion of such industries as already exist and the inauguration and development of new ones is felt as much in the Native States of India as it is felt in British India. The relationship and interdependence of territories directly under the rule of the Indian Princes and purely British territory has become so close and intimate that, progress or retardation in either is felt by the other. The war and the resulting activities of the Munitions Board clearly revealed the possibilities of industrial effort in this country, and the successes achieved, such as they were, under the pressure of compelling circumstance were so unexpected and phenomenal, that it could no longer be ignored that India, with her enormous raw produce, with latent capital only requiring to be tapped, organized agency, expect direction and cheap labour, is capable of taking a leading position among the manufacturing nations of the world. The investigations of the Industrial Commission, born of the successes and the failures of the Munitions Board's operations, have convinced the most sceptical that, although India is in the main an agricultural country, the industrial side of Indian life, so long neglected, is worth while being fostered and developed as much as possible, and that Government should, in many cases, initiate enterprize and, in all cases, encourage enterprize and establish industrial operations. Tentative efforts in this connection are slowly revealing themselves in British India, while Native States Rulers are, in consonance with the policy enunciated by the Industrial Commission, interesting themselves in the industrial and commercial welfare of their several provinces.

What Mysore has done, and is doing, is well known. Indeed, the success of Mysore in industrial activities is generally acknowledged and are in the nature of an object lesson to less progressive States. To carping critics her feverish desire to develop the industrial resources of the State, and the small degree of progress made in certain directions, the expenditure involved may appear to be inexcusable; but such non-successes are but stepping stones to eventual achievement. Be that as it may, Mysore is not the only Indian State that is endeavouring to build up new industries and to resuscitate moribund and, in some cases, defunct industries. The premier State in India in political status and extent of territory, Hyderabad, has taken some trouble to organize an industrial survey of the State and to improve that side of the life of her large population. Travancore, under Dr. Barker, is keen on industrial initiation and expansion while the northern States of Baroda and Holkar have just published—the former the 1917-18 Annual Report, and the latter a Report for the three years ending September, 1919. To notice the advance made in Baroda first: There is no necessity to mention the existing industrial concerns which appear to have maintained a steady position. It was felt last year, however, advisable to decentralize the activities of the Department of Commerce and Industries and a three-fold division of operations was decided on, under three separate officers—one in charge of Co-operation, one in charge of Commerce and Industry and, a third in charge of Statistics and Social and Economic Inquiries. Among the new industries started was a substantially supported tile and pottery works. But it is not in actual achievement that any real advance has been made, and the work accomplished during the year is by way of experiment and preparation for the future. His Highness the Gaekwar Sahib is closely acquainted with industrial and economic concerns in Europe and America and believes more in the slow building up of economic life than in making frantic efforts to establish concerns without a thoroughly stable foundation being laid. Under Social and Economic enquiries may be mentioned the redistribution of agricultural lands, an investigation of the old trades and handicrafts of the country, which once existed in the shape of organized guilds, and which have been converted, with the decay of Indian industrialism, into Caste organizations for social purposes. The relief to old and infirm persons in co-operation with State and village panchayats, in lieu of old age pensions, is contemplated a rural survey of the country and an enquiry into the economic condition of the people are also on the tapis. The State views with favour all applications from outside for the resuscitation or creation of new industries, while invitations to capitalists outside the State to undertake industrial enterprizes under favourable concessions was also attempted. Special investigation is being made in the capabilities of forest utilization, and the opening of a Forest Research Laboratory is under consideration. Loans are granted freely. Obstruction to industrial expansion occasioned by out-of-date Revenue rules and regulations is under enquiry in view to modification. The resources of the country are not yet tapped, and the Dewan of Baroda thinks that the salt resources of Dwarka afford opportunity for establishing an alkali factory while the manufactures of textile fabrics and woollen goods indicate large potentialities. The fishery work had to be discontinued, owing to fishermen finding more remunerative occupation elsewhere. The Geological survey is declared to be disappointing as regards metaliferrous deposits, but the marble quarries are an asset capable of development. Co-operative Banking needs stimulus and development. The general conclusion is that, Industrial and Commercial operations are still in a very tentative and incomplete condition. An

advance here and another there may not appear satisfactory, but like partially worked material in a carpenter's shop the totality of work done is considerable and sooner or later will take form in the actuality of accomplishment. Industrial and Technical Education is one of the main planks in the platform of the Department of Commerce and Industries and the report contains, in an appendix, a programme of nearly twenty industries regarding which steps are contemplated or are in progress.

THE HOLKAR STATE.

The triennial Report is disappointing, inasmuch as there appears to be a lack of sustained effort. It is depressing, for instance, to read that before Mr. M. V. Kibe assumed charge of the rather poorly constituted Department of Commerce and Industries—the lac industry inquiry was dropped as the propogation of lac proved a failure; that the possibilities of a pencil factory were given up owing to a Mr. Ernest Luber having left the country; that in the absence of proper material available for investigation into Chemical Industries an offer from a Panjab applicant was rejected; that no result was obtained about a proposal to manufacture cement; that a geological investigation of the Parda Iron mines led to no practical result; that an inquiry regarding the production of coal was terminated; that with a paper expert and a chemical engineer combined, no practical result was obtained regarding paper manufacture; that a scheme for a chemical laboratory is still under consideration; that, though a geological survey disclosed the fact of there being iron ore, copper, traces of silver and gold, manganese and other minerals in the State nothing has been done to exploit them; that a report on match manufacture and suggestions thereanent by Professer N. N. Godbole failed to win the approval of the Chief Minister; that wood distillation is still under correspondence; that, though a high percentage* of iron ore lies in the vicinity of Barwaha and an English company formed to work ore was unable to compete with foreign iron, and though, since then, Messrs Shorabji and Company of Bombay undertook to work the ore the matter is still under correspondence and is not mature yet; that several offers to start oil and soap industries are still under inquiry; that the revival of the Maheswar Saree industry, for which two schemes are before the Durbar is still under consideration; that proposals for the development of the tanning-and forest Industry (*sic*) was not favoured on financial grounds; that a scheme for the establishment of technical schools has not yet borne fruit; that the proposals long pending, for a leather industry has not "matured enough," and so on, and so on! It is a melancholy list of projects, schemes and might-have-beens which is suggestive of masterly inactivity, red tape and confiding innocence, which is deplorable. The Report, however, has its brighter side, in that there are twelve companies working flour, cotton and other mills, tiles and brick iron and brass foundries, electric supply and industries, printing presses, etc., with a total capital of Rs. 1,22,20,000 at work; that the glass industry shows signs of prosperity; that blanket weaving is more or less a success; that certain railway projects are contemplated; that banking facilities are being opened up; that four hydro-electric power schemes are being investigated but which, however, are not likely to be taken up, pending the inquiry of the Government of India on power schemes, on which Mr. J. Meares is on deputation; and that a paper mill is on the way of being established, with second hand machinery be it said, and pending disposal to private enterprize.

The report gives a long list of other industries to be started and some actually in existence which are the fruit of Mr. Kibe's earnest endeavours to recover the ground lost by his predecessors. The State has had

the advantage of the advice of Professor H. Stanley Jevons, and other, admittedly able, experts in industrial concerns. That the *Holkar* State is in a position to build up and expand the industrial life of the people of the province goes without saying; and if Mr. Kibe does not weary in his well doing, the next report will probably record much actual work done during the current year. Mr. Kibe must be congratulated on his activities and success, such as they are. The conservative character of the population and their unenterprizing spirit are great obstacles to surmount but none the less is evident an absence and push, intiative and sustained endeavour on the part of Mr. Kibe's predecessors which has retarded the industrial development of the resources in the Holkar State. It is necessary to observe that it is admitted that industrial and business incompetence was one of the causes of the numerous failures recorded.

Mention was made recently of the trials of agricultural tractors which were organized by the Indian Government at Nagpur. These trials were carried out under exceptionally difficult conditions, the ground being hard-baked after five rainless months, and it was considered doubtful even whether the tractors would be able to perform their allotted tasks. Five machines competed—the Austin, Cletrac, Fiat, Fordson and Lauson—the last-named being a particularly powerful American machine. The Cletrac machine was withdrawn. In the four hours' test the Austin and the Fiat ran each other rather close, the British tractor having the advantage of paraffin consumption, the quantity consumed being $37\frac{1}{2}$ pints for ploughing $1\frac{3}{4}$ acres to a depth of 7.07 inches. On the final results a good medal and Rs. 500 was awarded to the Fiat tractor, and a silver medal and Rs. 500 to the Lauson, while a special reward and Rs. 1,000 was made to the Austin, which was adjudicated the best in the light tractor class.

MYSORE SECONDARY SCHOOLS.

By Venkatarama Ayyar, M.A., L.T.,

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I submit for consideration the following few suggestions on the Mysore Education Memorandum. They relate to (1) the Introduction of Civics as a compulsory subject in the S. S. L. C. Curricula of studies, (2) the systematic medical inspection of School children, and (3) Moral Instruction in Schools and other minor topics.

Civics.

Education has now been accepted on all hands as the work of drawing out an individual's latent capacities and enabling him to fulfil his part as a citizen creditably to himself and usefully to others. This aim of Education for citizenship ought to control the curricula of studies in all High Schools. Our present S. S. L. C. Curriculum demands of all students a compulsory knowledge of (1) certain set Texts, Grammar and Composition in English and a Vernaculer, (2) the A. B. C. of Arithmetical and Algebraic computation, and (3) the mere rudiments of Physics and Chemistry. This scheme of studies is incomplete because of the absence from it of even an elementary knowledge of Civics. The present writer has sorrowfully observed the colossal ignorance that prevails among many youths that had just completed their secondary school course, not to make an irreverent mention of even older men, on matters like the actual relationship between a Native State and the Imperial Government, the functions of a Resident or Political Agent, the nature and scope of work of a Municipality or a Local Board and such other kindred topics. The introduction of Civics as a subject for public examination, on lines similar to those I have ventured to suggest hereunder, would surely tend to

remove all hazy or wrong notions now current and enable a student, when he grows up, to make an intelligent use of his vote and voice and to realise the duties and rights of citizenship in a civilised state.

The one objection that I have found seriously urged by some with whom I have had a talk over the subject (and whom I have eventually won over to my side) is that of overburdening what they considered an already heavy curriculum. The heaviness or otherwise of a curriculum should not always be judged solely on the single statistics of the percentage of passes at the public examination. I agree that the results thereat have not so far been highly encouraging and do warn us to pause and consider before proceeding further. But I am convinced of the fact that the present courses of studies are neither too light nor too heavy and that a boy of average ability devoting two hours every day to study at home can creditably cope with it. Hence the root of the malady lies elsewhere and not on the bogus of a heavy curriculum. Secondly, something in the direction of teaching Civics was formerly being attempted with the aid of a book known as 'The Citizen of India.' Again, the inclusion of Civics as a subject for Public Examination would even go to meet the flimsy, if not purely fanciful argument that some advance to the effect that the present system of examining all students together in Elementary Mathematics and Science operates to the disadvantage of students of History inasmuch as the Provincial average (they think) is unduly raised by the comparatively better answers of students of Optional Mathematics and Science. Here, then, is a subject where the students of History may try, if possible, to secure compensatory advantage. I would further suggest that the three subjects, Elementary Mathematics, Elementary Science, and Elementary Civics be treated as one whole group of subjects for all examination purposes, the Provincial and individual averages being struck by taking the three together.

The nature of the syllabus I desire may be gathered from the following rough sketch.

The British Empire—the various units comprising it—the Central Government and Legislature—The King—The three estates of the Realm and their respective powers—The Parliamentary procedure by which a Bill becomes an Act—The Self-Governing Colony and the Dependency—the Indian Dependency and its Government—The Secretary of State and His Council—The Viceroy and His Council—The Provincial Governments.

A Native State—The policy pursued with regard to Native States by Governors-General before the Queen's Proclamation—The Present policy controlling their mutual relationship—The Resident or Political Agent and his functions.

The Mysore State—A short sketch of its history till the Rendition—His Highness and Family—The Dewan—The Executive Council—The Representative Assembly—The mode in which administration is carried on in the various departments of Justice, Land Revenue, Excise, Forests, Mines, Industries, Agriculture, Police, Jails, etc.—Education in the State—Medical aid in the State—Income and Expenditure under the various main heads.

The Area and Population of Mysore—Its geographical features and climatic conditions—Its rivers and mountains—Forest and Mineral Resources—Agriculture and Industries—Railways and other means of traffic—Industrial and Commercial possibilities—The Kolar Gold Fields, the Sivasamudram Power Scheme—The Kannambadi Project.

The Important Cities and Towns—Municipalities and Local Boards and their constitution and functions—Temples, Mutts and other religious or charitable endowments—Places of Scenic, Historic or Archælogical Interest, etc.

This syllabus could be covered easily by a one-year's course in the sixth form of 2 hour periods per week, the altered allotment in the time-table being 7 periods for English, 3 periods for Vernacular, 4 periods for Elementary Mathematics, 3 for Elementary Science, 2 for Elementary Civics, 10 for the two Optional subjects and an extra period for Moral Instruction and Training. Thus, the proposed Civics Course will finely round off the general knowledge of History and Geography that students have gained in their IV and V Forms and earlier. A paper of 2 hours' duration on this subject may be set at the Public Examination.

MEDICAL INSPECTION OF SCHOOL CHILDREN.

That the physical well-being of a child is not only of paramount intrinsic importance but is also vitally and intimately connected with its intellectual and moral growth is now a matter of common knowledge. Youths, during their scholastic career, fall a prey to many physical deformities chief among which are Myopia, a Bent Spinal Column, and Contracted chest. In spite of all that a loving teacher can do by way of admonition and advice and that a sympathetic administration can do by way of well-lit rooms and Hygienic seats and desks, students assume very bad postures at study; many more, owing to City life, poor food or general debility have weak vision. Unless these are carefully examined by a competent medical officer who has had a liberal training and steps are taken to nip their growth in the bud, the defects continue to grow day by day till they become irremediable. The present writer had slight myopia in his IV Form; it was, however, not taken proper notice of, inasmuch as it was not glaringly seen on account of the habit of sitting nearest the teacher and the black board; he went on reading voraciously out of books in small print, at last the defect was noticed one day in the Sixth Form, when having gone unprepared with his lessons, he was sent to the last bench and asked to read out what was on the black board. Thus, due to sheer neglect, his myopia developed to a great extent; similar instances can be cited without number. All parents are not educated enough and even of those that are, many cannot and do not spare time to watch their children at study. Hence the State desirous of improving its citizens has a moral obligation to discharge in this respect. No system of education based on sound principles can therefore afford to dispense with the essential duty of providing regular medical inspection of the children in its schools. I know that the Department of Education and the University in Mysore are keenly alive to the importance of Medical Inspection and are concerting measures for the discharge of this function of theirs. It is my desire only to send in my humble petition to them for the speedy carrying out of their intended plans.

An annual medical Inspection of each pupil's height, weight, chest, lungs, eye sight, hearing and speaking, of which a permanent record might be left with the head-master, with an appended list of cases needing urgent attention or special treatment and the way such treatment should be carried out will surely enable the head-master and the sports committee to make each boy aware of his defect and its remedy and to insist on the regular attendance of such boys at prescribed games. Especially is this medical examination most necessary, during adolescence, as then youths are most impressionable, even physically, every year of postponement of this absolutely essential part of any educational programme on wrong notions of economy or otherwise means so much of physical degeneracy and consequent mental stagnation.

MORAL INSTRUCTION AND TRAINING.

At present, custom seems to be that one period per week shall be devoted to Moral Instruction when teachers either do their other lessons or occasionally preach a sermon as they like. Instead of allowing this

to be done as the whim and caprice of each individual teacher may direct, steps may be taken to provide each school with some collection of about a hundred stories culled from the world's mythology and published by the Department of Education for being taught in all recognised schools.

There is, again, one other aspect of Moral Training and Instruction, which is slowly gaining foothold in several Western countries, and which, I am sure, will have most salutary effects *viz.*, Sex Instruction in Schools. Teachers and Laymen would only be deceiving themselves if they shut their eyes to the prevalence (at least, to a slight extent) of immorality and sexual perversity in schools. This is sufficiently testified to by even the one fact of much obscene scribbling being found on the walls of latrines and other parts of almost every school. Three methods of reform have been attempted till now. They are (1) the conservative method of inculcating moral maxims by precept, (2) the method of self-assertion and co-education of the sexes, tried in various schools in America, and (3) the National method of full and free instruction of the nature and functions of each sex and the sacred duty of healthy parenthood. Wherever the last method has been adopted, there has been an almost unanimous pronouncement of splendid success. It is followed in several schools in Scandinavia, Denmark, France, Germany and America. The innovation, however, will surely meet at present with a storm of opposition from the vast majority of the conservative Indian Public, yet it deserves to be gradually popularised. India may not be fit for the second method of co-education for several decades to come; but a judicious course combining the 1st and 3rd methods could be adopted after a decade at least, if from now, steps are taken to popularise sex-instruction by introducing into School and College and Public Libraries all weighty literature bearing on the subject as the works of W. M. Gallichan, Havelock Ellis, Geddes and Thompson, Trall and others who have displayed great caution, keen insight, and found Psychology in their masterly volumes. This first step is fraught with no risk and may (I am sure, will), by drawing greater attention to the subject, lead to better results.

LIMITING THE STRENGTH OF CLASSES.

Classes in the Government High School, Bangalore, were, last year, on an average, 60 strong. In other places, I hear, the average was no less. This unweildy number tends to impair efficient instruction. No attempt at watching individual progress is even thinkable. To promote efficiency of instruction, it is imperatively necessary that the strength of a class shall under no circumstances exceed the liberal maximum of 40 boys. The Circular setting forth this principle should also explicitly state that the limit is perfectly inelastic If more schools are needed because of strict adherence to these rules they ought to be started, at any cost, by State or National enterprise.

TEACHERS' RETIRING ROOMS.

Education in Bipolar and both the teacher and the taught should ever be learners. Facilities should be given for putting this principle into practice. Every High School should, therefore, have as its ideal of equipment that of providing its teachers with separate retiring rooms. The present system of crowding not less than 20 teachers into one room, meagre in size and furniture, cannot but lead to idle chat. As a first measure, I would request that a room of the dimensions of the class rooms in the Government High School, Bangalore, be set apart for four teachers and not more and that sufficient screens and furniture be provided in each room so that they may be apart though within the same four walls.

CONCLUSION.

Many other defects in our present educational work will surely disappear when, after the introduction of Polytechnic schools and with the lapse of time, more books in the Vernacular, with an ample vocabulary of all scientific and technical names known to the modern world, appear in our land and, when the gulf between the so-called 'Literate' and 'Illiterate' is bridged over by making the mother-tongue the medium of all instruction and intercourse and when the word 'Illiterate', itself will find no place in our Census Returns by the free and compulsory instruction through the vernacular in the three R's of every citizen of the State.

ECONOMICS IN THE WEST.

Industrial Situation.

London, 15th April, 1920.—Our industrial situation is still a somewhat uncertain one. Labour is restless and we hear once more of demands for iucreases of wages, notably from the railwaymen and the miners. In this case " the appetite grows on what it feeds on." Additional payments secured with comparative Case lead to a desire to obtain yet more and so we go rouud the vicious circle. The present position of many sections of the working classes is really extraordinary if we compare it with their standing on the prewar period. The Dockers, for example, have just been granted by official award a standing wage of sixteen shillings a day. Many of us are old enough to remember the violent agitation which Mr. John Burns headed to secure " the docker's tanner" on sixpence an hour. In effect the dock workers are given a rate of pay which is three and a half times in excess of what they received a few years ago. Nor is this the whole of the story. The men under existing conditions work shorter hours and they do less for their money than they did. If we could be sure that the new standardised pay would stimulate the men to greater energy we might regard it with a certain equanimity though it puts a heavy handicap upon our shipping trade; but notoriously high pay goes with relaxed effort and we cannot look for any material improvement in tbe working system in the future, or at all events the near future. Probably for that we shall have to wait until the after war fever for a good time has subsided and the effects of foreign competition have begun to be felt. Disquieting, however, as the position of affairs is it might be a good deal worse. We have no monopoly of Labour troubles with their accompaniments of exaggerated demands for wages. Our greatest trade competitor the United States is on the throes of an acute crisis, and across the channel in France and Italy the nearest is still more marked. At the same time our trade is so good that it can bear quite extraordinary burdens. Indeed, there was never a time in modern history when the foreign demand for British goods was so steady and persistent in spite of the enormous increase in price that has taken place in almost every department of manufacturing trade.

INDIAN INDIGO INDUSTRY.

Professor Henry Armstrong has sent to the *Times* a long and interesting letter which contains matter of much encouragement to those who have hoped that the revival of the Indian indigo industry consequent upon the failure of the supply of artificial indigo owing to the war, would not be a mere passing phenomenon. The facts given in the communication are familiar to people in India who have kept in touch with modern developments in regard to the industry and more especially with the valuable work done by the Pusa Institute. But it may be of service to refer to some of the Professor's points which certainly illustrate in a remarkable way, the value of research in industry. Professor Armstrong after alluding to the changed spirit of the planters which has led to united action through the medium of the Indigo Planters Co-operative Association gives some figures which show how enormous is the field open to the operations of the indigo cultivators. Thus, he states that in 1913 Germany and Switzerland exported to China no less than 27,000 tons of 20 per cent indigotin-paste, the equivalent of 9,000 tons of 60 per cent indigotin indigo. Last year India produced only 600 tons of this grade, and even when the industry was at its highest the amount was only on an average about 7,000 tons per annum. In the Eastern market alone, therefore, the Indian indigo industry has a sphere of great potential value to operate in. Happily, as Professor

Armstrong shows, the authorities in India working in conjunction with the planters are showing a spirit of enterprise which encourages the hope that the industry may at no distant future be restored at least to the position it formerly occupied. The researches made by the Pusa authorities have led to a more intensive and scientific system of culture and under the skilled direction of the Institute we may look for a remarkable improvement both in the yield per acre and in the quality of the resultant indigo. In reference to the superior attributes of the natural indigo Professor Armstrong furnishes some interesting details of trials made with natural indigo in treating piecegoods. The trials, he states, were conducted by Messrs. George Garrett & Sons, a firm of great experience as indigo dyers. "Vats were set and worked with equal proportions of natural and artificial paste: two pieces were dyed at a time, equal weights of cloth being taken for each vat. The number of comparisons thus made was 37, using 74 prices of cloth. In each comparative trial the depth of shade produced was greater in the vat charged with natural paste. Mr. Reginald Brown estimates the superiority of depth in the series of dyeings at from 5 to 20 per cent. The difference is patent even to my uninstructed eye. A serge properly dyed with indigo should always rank superior to one dyed with indigotin only—hence we may hope that ere long indigo will again be available in our home market." In conclusion Professor Armstrong emphasises the distinction that there is between Indigo and indigotin. It is not permissible, he says, to speak of synthetic indigo, nor is it necessary to speak of indigo as natural indigo. "Whilst nature, assisted by man gives us indigo, art gives us but one of its constituents, indigotin. It is as in the case of fermented beverages; no art can give us a vintage wine—one of the most perfect of nature's products, to those who can appreciate perfection—but it is easy to make alcohol, even to produce it from coal with the aid of a waterfall." The whole letter serves to illustrate how valuable a possession India has in its indigo industry. It also points the moral that scientific research is imperatively necessary in this and hundred industries if full success is to be obtained. The communication will be an encouragement to those who in recent years have advocated and supported the policy of increasing the facilities for research in India.

CAMPHOR CULTIVATION.

Camphor is a commodity which ought to attract more attention than it does from topical agriculturists within the Empire. So says Professor P. Carmody in an article which appears in the *Times Trade Supplement* and no one who studies the facts will be disposed to disagree with him. The world's annual consumption of camphor is 10,000,000 lbs. and the demand is an increasing one despite the fact that the current price of the commodity is 23s. 6d. per pound. At the present time the Japanese have almost a monopoly of the market for camphor, but there is no substantial reason why it should not be produced profitably in most of the tropical regions of the Empire. An experimental planting of the camphor tree was made in Ceylon first in 1852, and more extensively in 1893 when seedlings were obtained from Japan, but the venture never proved a commercial success. More recently experiments have been made in British Malaya and the results though not final have demonstrated the possibility of cultivating camphor with a fair prospect of making a substantial profit. There must be many regions in India where Camphor trees could be grown under favourable conditions and if the culture is taken up it may be well for experimenters to bear in mind some of the precautions which must be taken if success is to be achieved. Professor Carmody states that seeds or seedlings from trees that yield no solid camphor must not be used under any circumstances, stiff clay soils must be avoided, not more than 300 trees to an acre

must be grown in good average soil or not less than 12 feet apart in hedge rows, and a sufficient area (from 100 to 500 acres if possible) for economical distillation. When the trees are four or five years old they can be dipped and thereafter the operation may be performed three or four times a year. The cultivation of the tree seems quite simple but doubtless there are considerable variations of production and quality due to local conditions. Moreover, the present high range of prices, or anything like it, for camphor cannot be relied on, and any intending cultivator will have to bear in mind the possibility of the market quotation for the commodity dropping to a few shillings a pound.

Manufacture of Nitrogen.

During the war we heard a great deal about the manufacture of nitrogen from the air by ourselves as well as the Germans. What was then done for munition purposes for the manufacture of explosives—it was hoped when peace came might be accomplished for industrial purposes. This expectation, it is satisfactory to state, is on the point of being realised inasmuch as arrangements are nearing completion by which the synthetic ammonia factory set up during the war under the auspices of the Faraday Society will be transformed into a commercial project on a very large scale, while many other fixation schemes are under consideration throughout the Empire. So are our weapons of war turned to ploughshares and our warrior scientists into men of business. What a pity it is that we cannot turn many other of our war departments to as good commercial use! We might then regard philosophically the liquidation of the enormous debt which they have helped to create. Not, however, that Commerce is not playing a big part in carrying on with war machinery. Only in the past few days, for instance, the arrangements have been completed for the sale to a big syndicate of the vast motor reparing depot at Slough over which there has been so much controversy. The price to be paid to the Government for the property, it is said, is to be six millions.

Profit Sharing.

Profit sharing is believed by many to be a panacea for the ills from which the Labour world is at present suffering. There is, however, not much in the latest Parliamentary paper on the subject—a recently issued report on "Profit sharing and Labour Co-partnership in the United Kingdom"—to encourage the faith that many people have in the efficacy of the principle. In all there were in existence on Oct 31, 1919, 182 schemes involving about a quarter of a million of work people. The number of schemes is not large having regard to the size of our industrial system. Nor is it possible to obtain consolation from the thought that the profit sharing idea is too young to have attained to full proportions. The first scheme of the kind of which the report takes cognisance was started as far back as 1829 and there are a number which go back forty or fifty years. What is most distressing is that since the official records were first compiled nearly 200 schemes have failed. Only 36 of the existing schemes, or one in five of the total, date back before 1901, and 95 date from 1911 or some later year. Various reasons are assigned for the failure of projects, the commonest being dissatisfaction of the employers or the employed with the results. In spite of the discouraging experience of the past the principle of profit sharing or more accurately, co-partnership is gaining in influence. Some of the largest banks are adopting the system by allotting special shares to their employes, and I hear of it in other directions. A significant indication of the drift of opinion on the subject is furnished in a letter contributed to the *Times* by Sir Charles Macara, the well known Manchester industrialist. In this communication in referring to the agitation

amongst the cotton operatives for increased wages—an agitation which may add from £50,000,000, to £70,000,000 a year to the charges on the industry—Sir Charles suggests that the best means of meeting the situation would be by giving the operatives their next advance in the form of monetary interest in the industry. "The proposal," he says, "opens the way for the workers to reach a position they have never before occupied in the industry; it enables them to conserve their increased wages, to obtain a share in the control of the industry, and to bring nearer 'nationalisation' in its best form." It remains to be seen how the operatives regard this proposal. Hitherto Trade Unions have found in profit sharing and co-partnership in the belief that such schemes weakened the workers spirit of independence, but the Lancashire cotton operatives are of high intelligence and are not likely to be swayed by narrow sectional motives if they think that the advantages they derive from the system will be of a substantial character. If they should agree to the proposal and the system was adopted throughout the industry an epoch making change would have been introduced in the relations of employers and employed, for this is peculiarly a case in which what Manchester and Lancashire said one day would be said by the whole country the next.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

The Floating Freight Trains of the Mississippi.

Washington, D.C., U.S.A., Apl. 21, 1920.—On a certain morning a few weeks ago the greatest inland waterway in the world, after drowsing along for years through all the din that a busy group of river enthusiasts could make, awoke to a sudden realization of modern conditions. The occasion for the quickening pulse that throbbed down the Mississippi River that day was relatively small—merely the arrival at the St. Louis (Missouri) docks of two new steel barges. Big as they were, modern to the last engineering detail, and extremely interesting in themselves, their real significance lay in the fact that they were the advance guard of a fleet of 40 similar barges, and of six new and powerful towboats, which are the locomotives of these latest of floating freight trains.

This $ 7,000,000 project is the government's convincing answer to the persistent prayers that have gone up for many years out of the Mississippi valley. It is the first official investment in floating stock in any way commensurate with the enormous sums that have been spent for improving the great track on which these mammoth trains will run—the big rivers of the Mississippi basin.

The new water tractors are of the twin-screw type, driven by engines of 20,000 to 25,000 horsepower. The propellers operate in steel tunnels under the stern, and by an ingenious arrangement the screw, although it is seated so high that its upper blades are above water level, is always submerged. The siphon action of a higher part of the tunnel, over the propeller, accounts for this paradox.

If the term "floating freight trains" brings up the familiar image of a railroad box car

or gondola, perhaps perched on a raft, the idea may be promptly dismissed. Each of these new all-steel barges holds 2,000 tons of freight—the equivalent of 20 to 100 cars. Each is 250 feet long, 45 feet in the beam, with a hold 10 feet deep surmounted by a 9-foot cargo box, giving a loading space 19 feet deep, 184 feet long, and 37 feet wide. Transverse and wing bulkheads, the latter oil-tight, divide the hold into 18 compartments, and there are 16 hatches 14 by 16 feet, and 16 double sliding doors, eight to a side. The scow-shaped hulls are designed to offer the least possible resistance to the water on the upstream tow, and their draft is comparatively small. Five of these barges and one towboat constitute a "train," with a total capacity of 12,000 tons of freight. The schedule time for such a train from St. Louis to New Orleans is four and one-half days, which is actually less than rail freight schedules.

While all these preparations for an immense organized transportation system on the lower-river are in the making, the upper reaches of the great river are not being neglected. Up in the St. Croix River a steel barge even larger than those of the down-river fleet has been launched the nucleus of another flotilla of 24 freighters and four towboats, for trade between Minneapolis, Minnesota, and St. Louis, Missouri. These up-river barges are 300 feet long and 48 feet wide, carrying 2,600 tons. They cost $ 170,000 each.

Foreign and American Cotton Consumed in the United States.

The United States Department of Commerce has just issued interesting statistics of the cotton consumed in this country. This applies both to American-grown cotton and the foreign product.

The figures show the cotton consumed in the United States in the month of March, 1920, to have been 575,704 bales, compared with 433,485 bales in March of 1919. 4,235,499 bales were used in the eight months ended on March 31st, 1920, as against 3,817,469 in the corresponding period ended March 31st of 1919. These statistics are given in "running bales," counting round as half bales, except the foreign cotton, which is in equivalent 500-pound bales.

There were on hand on March 31st, 1920, 1,900,000 bales in consuming establishments and 3,300,000 bales in storage warehouses and at compresses, as compared with 1,470,000 bales and 4,327,000 bales, respectively, on March 31st, 1919. The 1920 figures include 40,800 bales foreign and 5,500 sea island bales consumed, 95,000 foreign and 23,000 sea island in consuming establishments, and 72,000 foreign and 18,000 sea island in storage.

Imports of foreign cotton during the month of March, 1920, totalled 134,000 bales (500 pounds each), while in the March of 1919 the amount imported was but 15,561 bales. During the eight-month period ended on March 31st, 1920, the United States imported 567,000 bales of foreign cotton, against 91,600 in the same period ended on March, 31st, 1919.

Exports of domestic cotton and linters amounted to 795,000 bales in March of this year, as against 504,000 in March of last year. The exports for the eight months ended March 31st, 1920, were 5,300,000 bales, and for the corresponding period of 1919 were 3,500,000 bales.

America Exports Typewriters to 97 Countries.

Typewriting machines were exported by the United States to ninety-seven countries in the calendar year 1919. These were valued at $ 18,391,000. England was the largest buyer, taking $ 3,071,368 worth. The next five countries in order of amounts taken are as follows: France, $2,686,177; Canada, $1,032,191; Italy, $846,799; Brazil, $ 611,260; British India, $ 573,690.

MACHINE TOOLS MADE OF CONCRETE.

Much interest has been created all over the United States and in other countries in a newly-invented planer of record-breaking size, and a machine for boring holes of any size or length. The planer is designed especially for producing the boring machines, and is a radical departure from anything hitherto attempted in the machine tool line, while the possibilities suggested by its construction are numerous in a great number of fields. The planer is built of concrete and iron, and is the first machine of its kind that has ever been built of that combination. It is also the biggest planing machine in the world.

These machines are so unusual in construction, and can be built with such speed, that the methods of manufacture are attracting wide attention. An attempt to build the big planer of iron, according to regulation methods, would have meant a delay of at least two years. By the new method they can be turned out ready for use in two months.

The original construction plans for the planers provided for a battery of four machines, each with a bed 184 feet long and 17 feet wide. Four of the machines are now completed and in use, and two others are in process of construction. Each planer weighs about 2,500,000 pounds, and contains approximately 212,000 pounds of iron and steel casings and 14,000 cubic feet or concrete reinforced with 34,000 pounds of steel bars. The bed of the planer is designed like a huge concrete girder intended to support a load, which accounts for the high percentage of steel reinforcement. This was done to avoid any possibility that the bed might settle at any point and destroy the alignment of the ways.

On the bed of the planer there is a sliding platen, which moves in iron grooves. The platen weighs 69 tons, and upon it is placed the work that is to be planed, two heavy travelling cranes being used for the latter purpose.

The power for running each planer is furnished by two 40-horse power, three-phase, 60-cycle motors running at 1,800 revolutions per minute. One motor drives the table forward at a speed of approximately 20 feet a minute while the other gives a rapid return of approximately 40 feet a minute.

The method of feeding the cutting tools might be termed "human feed," and is perhaps as unusual as the planers themselves. No automatic means of feeding is supplied, each cutter head being controlled independently in both horizontal and vertical direction by a man stationed on the top of the housings. Four 24-inch hand-wheels are conveniently located for the operator at this place, and the shaft carrying each hand-wheel also carries an index finger which, in conjunction with a graduated dial, forms the means of guaging the rate of speed.

The boring machines being made on the planers can handle a piece of metal 38 feet long.

A FOLDING CAMP STOVE.

A camp stove to be success must be light, compact and easy to set up. It must also have some appliance for sheltering the flame from the wind. A stove just awarded a patent here has all of these qualities, and is unique in many other respects. It weighs 27 pounds, measures 10 by 15 by 24 inches and can be set up or taken down in three minutes.

The cover and two side pieces of this stove made a wind-proof shield, and the hinged lid, which is uppermost when the stove is carried, drops forward when the stove is placed in position for cooking, and forms a shelf.

To make this stove, purchase a small two-burner gasoline stove on sale everywhere, and wreck it, as these burners can hardly ever be bought separately. Use the top, burners, piping, and tank for the new stove,

and make the rest out of light sheet iron. Rivets may be used throughout in putting it together, no soldering being necessary. The stove can thus be folded compactly for travelling, and is readily unfolded for use in a few moments.

NEW PRESS PRINTS, ADDRESSES AND SIGNS LETTERS.

Believing that "filled in" circular letters receive but scant, if any, attention from the average busy business man, a manufacturer, after long experimentation, is now producing on automatic press most ingeniously constructed which not only prints the colored letter-head and signature, but (which is far more important) actually "typewrites" the name and address in a color and position which perfectly match up with the body of the letter.

When in operation, paper from a roll $8\frac{1}{2}$ inches wide is fed into the press with great rapidity, 11 inches at a time. The body of the latter is first imprinted by means of a type bed, inked ribbon and moving roller. This part of the operation is somewhat on the order of the well known "Multigraph," so universally used. The name and address on a small zinc plate, having follen into place meanwhile, the ribbon and roller then print the "fill in" in exactly the right place and colour. The paper strip passes next into a cylinder press, where it takes impressions from two electrotype plates, one for the letter-head and one for the signature. A knife then cuts the paper to size, and the letter is ready for mailing.

The machine is said to be useable for many purposes where any kind of printing is required, and is being put into operation in many places as an ordinary printing press, as an envelope and wrapper addressing machine, or for ruling and cross-ruling order blanks and forms of many kinds.

AN ELECTROLYTIC RECTIFIER FOR CHARGING STORAGE BATTERIES.

The automobilist, amateur or professional, will find the rectifier to be described both cheap to construct and quite efficient. It is of the single-cell type, but by using three electrodes and a special lamp bank it uses both sides of the cycle. This construction is much cheaper than the use of an auto transformer and almost as efficient.

The lamp bank and switches are mounted on a board one foot wide and two feet long. Eight lamp sockets are mounted in two rows, with two double pole switches at the bottom. These should be 10-ampere indicating snap switches. The terminals for connecting to the storage cell to be charged are located at the lower edge of the board. The board is then mounted on the wall convenient to a source of alternating current, a shelf to hold the rectifier cell being placed above it.

For the cell container any large glass or porcelain jar will serve. The jar from a 300-ampere Edison primary battery is ideal. If one of these is not available any jar 7 inches in diameter and 12 inches high may be used. Make a cover of wood, and impregnate it with paraffin. Three holes are drilled in the cover to support the plates.

The plates measure 3 inches wide and 11 inches long and $\frac{1}{16}$ of an incb thick, two being of aluminum and the other iron. Holes are drilled in the ends of the plates before ending, and then they can be mouuted in the cover by bolts that form terminals. Connections are to be made to these terminals by flexible leads.

This outfit is said to be quite practical and serviceable. The maximum direct current obtained is four amperes.

PLATING BY COMPRESSED AIR.

A new metbod of plating metals, in which compressed air is employed, is meeting much success in the United States. The surface to be placed is cleaned with chemicals and then a thin sheet of the plating metal is blown on with a device resembling a hand torch. The torch contains a small electric furnace which reduces the plating metal to a liquid, and through the connection with a

tank of compressed air the molten metal is sprayed into the surface.

By this method, brass, gun metal and copper are put on iron or steel for such parts of machines as require it, the coated metal parts being used instead of the solid metal.

This particular compressed air and electric furnace plating scheme is portable and declared to be most convenient in usage. It will doubtless have a wide use in the coating of tanks and other large structures where the plates cannot be plated before erection.

The well-known "Schoop" process is said to be about eight years old, and is capable of depositing lead, tin, zinc, aluminum, copper, nickel and their alloys on any coherent object, metallic or other. The difference between the Schoop method and that here described is that the former involved the use of a "pistol," air at 40 pounds pressure, a tank of hydrogen and another tank containing some reducing gas, usually oxygen, the metal to be applied being liquified in flame; whereas, in the latter a small electric furnace is utilized to make the metal molten before it is projected by the air pressure.

The Schoop process has been used in the United States to some extent, but is still susceptible of considerable development. Here its use is said to have been wholly for its convenience in ordinary practice and not as economical expedient.

ALFRED T. MARKS.

NOTES.

We in Mysore are talking of sugar production, while others are doing. In a review of the Sugar Crop of the West Indies the Canadian Trade Commissioner states that the quantity of sugar and molasses exported last year fell below the estimate by nearly 24,000 tons. Slight increases over their estimates were made in Jamaica, Barbados, St. Kitts and St. Vincent, but a shortage of 30,000 tons ocurring in Trinidad and British Guiana, left the net total shortage as stated above. In British Guiana the shortage was accounted for by the scarcity of labour in the colony, but in Trinidad there was no apparent good reason why there should have been a shortage. In the statement of the export of sugar given in the following table, cane syrup, stated in terms of sugar, is included, three puncheons of syrup, being taken as equal to one ton of sugar. The total export of these together amounted to 267,247 tons. The quantity of sugar exported, without including syrup, was 239,883 tons, a good pre-war average, and the quantity of syrup and molasses was 93,027 puncheons, of which Barbados exported 81,111 puncheons. The following table gives the quantity of sugar exported last year, and an estimate of the crop for the present year, which includes syrup equated to sugar :—

	Exports, 1919. Tons.	Estimate, 1920. Tons.
Barbados ...	75,271	50,000
St. Kitts	10,901	15,000
Antigua	12,841	16,667
St. Vincent ...	570	1,136
Trinidad	37,805	40,000
Jamaica	43,000	48,000
British Guina ...	83,140	96,000
St. Lucia ...	3,661	4,400
Montserrat ...	58	115
Total ...	267,247	271,318

Electrification of railways has been urged by many. According to the Swedish press the Administration of the State Railways has presented to the Swedish Government a detailed statement with an estimate and plan for the continued electrification of the State Railways, and a more detailed proposal for the electrification of the Stockholm-Gothenburg line. (See page 183 of the "Journal" of 8th August.) The Administration request the Government to apply to the Riksdag for their sanction to commence the electrification of the Stockholm-Gothenburg line at a cost of seventy-five million kronor, for which amount they suggest a temporary Government loan should be granted. As regards the general electrification of the Swedish State Railways, the Administration consider that, in view of the abnormal prices of fuel, this is very desirable and advisable. As such an undertaking would, however, entail a considerable outlay of capital, the electrification would have to be carried out successively in restricted areas and in fixed periods. In investigating whether the necessary electric energy can be supplied for the general electrification of the Swedish State Railways, the "train kilometres" and "gross ton kilometres" for 1913 have been doubled. It is calculated that eight power stations, each with a separate district, could be counted on to supply the power. These stations would be at Porjus, in the Ume, Indal, Dal (two stations), and Motals Rivers, at Trolhattan on the Laga River. The consumption of electricity by the State Railways from these eight stations is calculated at 412,851,000 kilowatt hours, and by the private railway at 294,852 kilowatt hours. After the completion of the Stockholm-Gothenburg line, the Jerna-Norrkoping, the Katrineholm-Malmo Trelleborg, and then the Stockholm-Bracke lines should be electrified.

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The demand for cement in India is growing at such a rate, and the prospects and conditions of cement manufacturing in India are considered to be so distinctly good, that several new cement projects are beieg actively investigated. The Katni Cement and Industrials Co., Ltd., of which Mr. P. C. Dutt, the barrister and industrialist, was the originator, has now become the largest producer of postland cement in India. Messrs. Tata and Sons, and Messrs. Killick Nixon's Bundi factories have also been important producers, and under the guidance and control of Sir Thomas Holland, the efficiency of these three factories were greatly increased during the war. And now under the auspices of the Associated Portland Cement Ltd., a powerful British combine, limestone deposits in Bihar and Burma have been investigated and works are about to be erected near Dehri-on-Sone. It is further reported that an entirely new project for manufacturing portland cement on the largest scale at Bezwada has been matured by Mr. A. Ghose, the well-known mining specialist. Messrs. Burn & Company have recently floated a company with a capital of one crore of rupees for manufacturing cement near Jukahi in the Central Provinces. Another large cement project is, it is reported, being investigated by Messrs. Tata & Sons in Hyderabad, Deccan, and extensive limestone concessions have been granted by H. E. H. Nizam's Government, Mr. Mitchell, a cement expert, has been examining cement projects in Gwalior and Kathiawar on behalf of Mr. Narottem Morarji Gokaldas of Bombay. Further more, the Government of the Punjab contemplate establishing a large cement factory to meet the requirements of that province.

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During an address by Sir Lomer Gouin, Prime Minister of the Province of Quebec, to the members of the Canadian Pulp and Paper Association at the annual banquet held in Montreal, emphasis was laid on the necessity of conserving and restocking the provincial timber lands. The Premier said that there were 45,000,000 acres of land

under licence, with a reserve of 75,000,000 acres of virgin forest. He claimed that the Province of Quebec had more than one-half of the entire pulpwood supply of Canada and the largest unit of forest wealth in the world. He further stated that there had now been cut about 1,000,000,000 feet of timber, and he was informed that with proper management there might be cut four or five times more than that without endangering the future supply; that is, he explained, from the land under licence and not including the 75,000,000 acres which belong to the Crown. He added that the Government's purpose was to make an inventory of these Crown lands, for which purpose they would establish posts at Hamilton Inlet, Ungava Bay, and James Bay, from which points investigations would be made and aeroplanes would be used if necessary, these stations being connected wireless. He emphasised especially the importance of keeping the raw material for the use of the Canadian pulp and paper plants, and indicated that this policy would not be relaxed, suggesting that the Provincial Government might act further and that the time might come when they would have to limit the cut of the Quebec forests for the exclusive use of Quebec mills.

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The German Press has paid considerable attention of late to the formation of an association, which was formed in 1919, and has as its purpose the representation and development of the German industries, and the determination of uniform policy of each separate trade, and common action in dealing with labour questions. The association consists of a Council and Directorate, the latter consisting of at least 30 and not more than 60 members, who either occupy or have occupied a leading position in an industrial undertaking, or have held a position on a Board of Directorate. The Council is empowered to nominate a further 10 members to the Directorate. The Council itself is composed of 7 to 15 members, and is elected from the members of the Directorate. A Main Committee is also nominated, states the *Deutche Bergwerks Zeitung*, and consists of representatives of each of the 25 industrial branches into which the Association is graded. The total number of representatives is 140. The Main Committee nominate special Committees and elects from year to year a Committee of Investigation. The following special Committees have been formed:—

(1) Committee for the carrying out of the Articles of the Treaty of Peace.
(2) Tax Committee.
(3) Economic Committee.
(4) Social-political Committee.
(5) Press Committee.
(6) Committee of investigation.

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A conference of South Africa Co-operators was held in Pretoria early this year, at which resolutions were passed expressing the opinion that in order to safeguard and extend co-operation amongst farmers it is necessary to have one over-ruling central organization. The Conference appointed a sub-committee to inquire into the necessity for legislation, and to keep specially in mind the necessity or otherwise for such legislation to provide for the imposition of penalties on disloyal members. The Durban Chamber of Commerce in its Annual Report for 1919 makes no comment upon the practice of individuals forming themselves into private societies to provide their own capital and pay their own officers for the marketing of the goods they sell and the purchase of the goods they buy. On the other hand it places on record that it must consistently oppose the loan of public officers to such societies, whose purpose is to increase the private wealth of their individual members. From the published report of the proceedings of the Conference, it states, there appears to be a danger of the formation of a Trust for the whole Union, which may attempt to control the prices of agricultural products, and to punish those of its

members who sell their produce privately or in the open market. The Chamber adds: "The term 'co-operative' has hitherto been associated with bodies of consumers seeking to reduce the cost to themselves of foodstuffs and other necessaries of life. It is now being adopted by other bodies with other objects."

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A Government of India Department of Commerce, Press Communique dated Simla, the 14th May 1920, says:—With reference to the recent announcement in the press on the subject of the prohibition by the French Government of the importation of luxuries into France, the Government of India cabled to the Secretary of State for full particulars. The Secretary of State has replied that the full text of the French import prohibition list appeared in the *Board of Trade Journal* dated the 6th May, and that the following are the items in which India appears to be seriously interested:—Cut Precious stones; Fine pearls; Woollen carpets made with knotted or twisted pile, including imitations; Carpets of wool mixed with other materials; Fabrics of goat hair; Many kinds of silk fabrics; Trimninga, ribbons and braids of pure jute. In addition to these, the following are referred to as requiring licenses under decrees already in force:—Tobacco; mineral oils for illuminating purposes; heavy oils and residues of mineral oils. The import prohibitions apply also to Algeria, but are subject to the execution of special international agreements. They do not apply to goods imported for re-export either under the ordinary temporary importation regime or under the special regime set up by the decree issued on the 16th April, 1919.

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The Government of India has decided to re-organize entirely the existing wireless telegraph system, and also to extend it considerably, with a view to improving its efficiency in every possible way. An Indian Wireless Telegraphy Board has been formed, and the new Civil Wireless Department will be placed under the Director-General of Posts and Telegraphs, and it is hoped that the new arrangements will not only improve the means of communication with ocean-going vessels but will also be of great service in the development of commercial aviation. A special advisory board is to be set up with the following functions, viz:—(1) To co-ordinate the commercial, strategic, and naval requirements of the Indian Empire in connection with wireless telegraphy. (2) To advise on any questions that may be referred to them by the Director-General of Posts and Telegraphs. (3) To make any such recommendations as they may consider necessary on questions of general policy where the interests of more than one department are concerned. It is hoped that further particulars as to the special functions and powers of this board will be forthcoming shortly, and that the example thus set will be followed in both South Africa and Australia.

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The need for an extension of tobacco cultivation in the Empire is similar in some respects to the need for further cotton production, says the *Times Trade Supplement*. For a very large proportion of our requirements of raw cotton we are dependent on the United States. An even larger proportion of our imports of tobacco is obtained from that country. Such dependence on our principal creditor is a great handicap to the nation in its present task of restoring the balance of trade between the United States and the British Empire. Tobacco cultivation cannot be largely extended at a moment's notice, but now is the time for serious effort to increase the production of tobacco within the Empire. To achieve success in tobacco-growing and curing requires rather more than average care and intelligence, but the reward of success is proportionately high, and the rebate of duty on imports into the United Kingdom of tobacco produced in

British territories is an additional inducement.

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It is estimated officially that the sugar production of Queensland for 1919 was about 155,000 tons. During the last six months of 1919 the weather was exceptionally dry, and the outlook for the current year was bad, the ratoon, or re-growth, crops making no progress, and the plant cane, though started, standing still. Summer showers and storms were of local value in places, but the monsoonal, or wet, season set in in good time, and now excellent rains are reported. In 1917 an area less than that at present under crop for the 1920 crushing produced over 300,000 tons of sugar, or with New South Wales and Victoria, 30,000 tons above the official estimate of Australian consumption. Whether the official estimate of 280,000 tons as the Australian consumption is correct seems now open to review, in the face of the great increase in the production of jams, biscuits, confectionary, preserved milk, and other foodstuffs consuming sugar.

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Since the outbreak of the war over 20,000 companies have been formed in Japan, with an aggregate capital of about 4,000,000,000 yen. Many of these companies are far from being sound, and their promoters have contrived to unload their shares on ignorant country people and get out themselves with a profit. It is now reported that the authorities intend to stop this practice by means of legislation founded on an old German precedent at a time of reckless company promoting. According to this report, it will be provided by an Imperial Ordinance that any promoter or supporter of a new company who sells his shares in that company may be compelled to re-purchase such shares at the price received by him within a specified period of time—probably one year from the date of sa

In a recent publication of the French Ministry of Commerce attention is called to the value of the fibres of the agave or aloe as a material for the manufacture of rope. It is estimated that the production of aloe fibre in 1912 amounted to 152,000 tons, of which 128,000 tons were contributed by Mexico, and 16,000 by German East Africa. Successful experiments in the cultivation of the plant have been made in such French colonies as Guadeloupe, Martinique, Guiana, and the Sudan. It is claimed that aloe rope is very light, that it has great powers of resistance, and that it only stretched 2 per cent in water. It is considered that the climates of Tunisia and Indo-China are favourable to the cultivation of the plant.

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The Madras Government have passed orders making it clear that a sum not exceeding Rs. 25 may be granted as a free gift at the discretion of the District Magistrate, to adolescents released whether finally or conditionally from the Tanjore Borstal Institution. The grant is to be used, as a rule, to set the boy up in life, *e.g.*, by providing him with tools for his trade. The Government point out that it will rarely be advisable to hand over the amount to the released person in the form of money. Where an Honorary Probation Officer has consented to look after the welfare of the boy, the Government suggest that the utilisation of the amount may be entrusted to him.

GLEANINGS.

The Conservator of Forests of the United Provinces, India, has recently asked the Department of Overseas Trade to be placed in communication with British firms manufacturing agricultural steam engines for cable ploughing and cultivation, together with the necessary implements. It is intended to break up considerable areas of heavy grass land in the United Provinces preparatory to afforestation. At present, it appears, only one set of tackle is required, but if the experiment prove successful the work will be greatly extended and more plant purchased. Manufacturers who are interested are asked to avail themselves of this opportunity. The fact that it should be necessary to apply to the authorities here for the names of firms suggests the inadequate system of advertising British goods, especially machinery, in the East. Obviously, if an official cannot find the manufacturers he requires, how can private buyers be expected to do so? It is admitted that American and Japanese manufacturers, whose recent efforts to gain the markets in the East are well known, owe their success to a great extent to their system of publicity and to the mediums they use in advertising, which enable all buyers in the East to find them.

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A special type of electric welding machine has recently been placed on the market, designed for the purpose of welding seams in cylinders from, say, 2½ to 4 inches in diameter and from 4 to 8 inches in length. Either sheet iron or steel, or lead-coated metal can be dealt with, and a completely gas and water-tight joint made at a single operation. It is not, however, sufficient for a number of purposes that such a joint should be mechanically sound, and the machine has consequently been designed with a view to making an absolutely smooth joint which can be plated or enamelled without any further finishing being necessary. As a matter of fact, this machine can be used for finishing of articles that have been drawn or spun to shape before the welding operation is carried out. It is consequently likely to prove of great service in the hardware trade for finishing off hollowware of various kinds. The machine can be driven by a half-horse power motor, and it only occupies a floor space of 16 by 70 inches. It is 50 inches in over-all height, and whilst the maximum diameter of the die that can be used is 5 inches, the upper die has a travel of from 5 to 9 inches.

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The trade with India in agricultural machinery is reported to be developing greatly. Ploughs for bullock haulage are in big demand, as are mowing machines of a light pattern, but the most improved line is said to be that for small-size portable threshers. It is said that a substantial trade has been done in this direction, because it has been found that the small machines are far more easily transported than the heavier and bulkier types—an important point to consider when the state of the Indian roads and bridges is borne in mind. Machines for India have to be made of special wood to withstand the onslaughts of insects, and it is asserted that certain developments which have taken place in this respect quite recently have made British threshing machines very much in favour with Eastern users.

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According to an official statement recently published by the *Office des Renseignements Agricoles*, the rearing of the silkworm in the nineteen Departments where this industry was carried on occupied no fewer than 52,401 persons. The quantity of "grain" (silkworms' eggs) incubated was 65,983 lots of 25 grams (nearly an ounce) each, of which 63,277 lots were of French, and 2,676 lots of foreign origin. The total production amounted to 2,671,623 kilogs of cocoons and

(*cocons frais*), that is to say live ones. This gives an average of about 40½ kils., or about 88 lb. per ounce of 25 grams of seed hatched. The average price per kilog of cocoons was 7·53 francs for cocoons for spinning and 7·85 francs for reproduction of eggs. The total amount realised by sale of cocoons was 20,121,402 francs.

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Mixed with a solution of 10 per cent acid and 10 per cent alkali, bananas give a weak acid reaction. The bananas are subjected to the action of the solution for some days, the solution being gradually heated up to the boiling-point. The preparation may also be made with iodine or with a metallic salt; on using iodine a much richer and wider range of colours may be obtained. The dye thus obtained, according to the *Indische Gids*, can be used in the preparation of wool, cotton, leather, silk, feathers, etc., by using some tanning acid or the like. It is also stated that a considerable difference is made in the range of colours obtained according as to whether the fruit is more or less ripe.

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A Vienna engineer named Jeansch, addressing the members of the Institution of Civil Engineers, suggested a floating tunnel for the English Channel, to consist of ferro-concrete tubes, and to be placed a few yards below the surface, where the currents are slight. The tunnel, it is suggested, could be held secure by wire cables to the bottom of the Channel, and be constructed in a year at a cost of about £9,000,000. It is contended that such a tunnel would have considerable advantages over an underground tunnel, which would be a more difficult and more costly enterprise. It is added that similar tunnels would be suitable for the Straits at Dardanelles and Gibraltar.

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Since the inauguration of civilian aviation in Great Britain on May 1, 1919, until March 6, 1920, the records of the Handley Page commercial aeroplanes are as follows:—Total number of passengers carried, 4,217 total amount of freight carried, 50,653 lb.; total mileage covered, 82,428. The above figures include passenger flights at Cricklewood, London, in the United Kingdom and foreign countries, and passengers and freight carried on the London, Paris, and Brussels air services. On the Handley Page continental air service between September 2, 1919, and March 6, 1920, 764 passengers and 23,344 lb. of freight have been carried over a distance of 47,545 miles.

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What a tremendous loss to a country industrial strikes cause is shown by figures compiled in London regarding the big strikes in England. They show that from January 1 to November 30, 1919, the loss of working days from strikes reached the stupendous aggregate of 32,769,000, and if we add to these figures the unemployment caused to workers in other trades by the nine days' railway strike, the engineering strike, the Yorkshire miners' strike, the iron-moulders' and other strikes, the total does not fall short of 40,000,000.

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Professor E. Midgley, of Bradford Technical College, speaking recently of the defects in fabrics, declared that the standard of perfection was higher twenty years ago than at the outbreak of the war. He said that there is great opportunity now for the further application of chemical methods in cloth finishing, with a view to obtaining improved handle, appearance, firmness, and permanency of finish. No branch of the textile industry provides such opportunities for original research and experiment as does the dyeing and finishing section.

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A new form of electrical vaporiser has recently been placed on the market by a leading British firm of electrical manufacturers. Simple in construction, it consists of a well-made asbestos cushion, which contains a highly efficient electric heating element.

This cushion is mounted on a base which can be fixed in any desired position. For medical and fumigating use the base can, of course, be just placed in position, but where the vaporiser is to be used for industrial purposes it can be fixed with screws or bolted down.

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British banks are alarmed at the large volume of speculative investments, and have decided to curtail their customers borrowing by exercising a close scrutiny of proposed investments, and requesting reduction of overdrafts. The bulk of the investments in the present year have gone to cotton and shipping shares. Cautious financiers anticipate reductions of the profits in these concerns. On the other hand, the principal Atlantic shipping companies announce considerable increases in freight rates.

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During a discussion on the question of the embargo on the export of gold in the House of Assembly of the South African Union, the Minister for Railways (Mr. H. Burton, K.C.) said that the gold premium had resulted in an organized traffic in the smuggling of gold to India. Since the year 1914 the leakage had amounted to about £ 6,500,000. The position had grown more acute during the past few months, the leakage in that period having been about £1,000,000.

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A notification has been published in the District Gazettes under Section 9 of the Madras Village Courts Act, 1888 (as amended by Act II of 1920) directing the establishment of 157 panchayat courts in the districts of Chingleput, Trichinopoly, Anantapur, Tinnevelly and Malabar. The largest number of courts are in Anantapur and Malabar districts in which no less than 63 and 49 of these panchayat courts are to be set up under this notification.

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Who were the first? Professor G. T. Morgan, lecturing to school teachers at Finsbury Technical College, on the subject of the dye industry said he wished to repudiate a mistaken view that the dye industry was discovered in England and stolen by Germany. "I admit the Germans are capable of stealing anything," he said, "but we must give the devil his due, and not even the Hohenzollerrs could have stolen the industry, because we never had it."

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Three tractors have been purchased by the Agricultural Department of Madras and ploughing demonstrations have been given at various places under the supervision of the Government's agricultural engineers. Further tests are being widely advertised with a view to interesting Indian agriculturists in the use of tractors. It is confidently predicted that India will ultimately prove a very good market for motor-ploughs and tractors.

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A bag-making factory will shortly commence operations in the neighbourhood of Johannesburg, according to a statement appearing in the Cape press. The company will be known as Textiles, Ltd., and will manufacture grain bags, coal bags, sugar pockets, bath mats, etc. It is stated that fibre is available within the Union in unlimited quantities.

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An official report quoted in the "Asahi" of 6th January states that the amount of steel sold during 1919 by the Government Iron Works to Government and private consumers amounted to 310,367 tons. This shows an increase of 13,172 tons over 1918.

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A Washington message says that the imports from Germany to the United States during February last amounted in value to 3,881,000 dollars, and the exports from the United States to Germany to 18,598,000 dollars.

TOPICS FROM ECONOMIC PERIODICALS.

SCIENTIFIC WORK IN INDIA.

Its Organization and Development.

Nature in an interesting article says:—

The reorganization and development of scientific work in India are now under consideration, and important and far reaching decisions on these questions will shortly be made by the Secretary of State. It has already been decided, both by the Government of India and by the Secretary of State, that large sums of money must be found at the earliest possible moment for the purpose of fostering the development of the Indian Empire by means of scientific research. The principle of State aid on a generous scale has been accepted, but the important question of the best method of utilising this form of assistance in the future development of India remains to be settled. These matters were referred to by the Viceroy on January 30 last in his speech opening the present session of the Imperial Legislative Council at Delhi. It is evident from the report of Lord Chelmsford's remarks which appeared in the 'Times' of February 6 that the Government of India is now considering large schemes of expansion in regard to the scientific activities of the State.

Two policies at present hold the field: (a) Centralisation under a proposed Imperial Department of Industries of the Government of India in which chemists, botanists, zoologists and so on will be formed into district, water-tight, graded services, each under the control of a departmental head; and (b) decentralisation under which the scientific workers at the varions universities and research institntes will be given as free a hand as possible.

The policy of centralisation and the creation of graded scientific services have been strongly advocated by the Indian Industrial Commission, which was presided over by Sir Thomas Holland, formerly Director of the Geological Survey of India. It is favoured by a number of administrators in India who consider that some measure of official control is necessary for all scientific investigators, and it has also received the support of several of the scientific witnesses examined by the Commission. The arguments advanced by Sir Thomas Holland and his supporters in favour of centralised scientific services are set out in detail in chap. ix of the Report of the Indian Industrial Commission, published last year (H. M. Stationery Office; Cmd 51.) The nature of these arguments will be evident from a study of the principles and the rules which they suggest should be adopted for the formation and control of the new Chemical Service. It is proposed to proceed with the creation of this service as soon as the committee now dealing with this matter in India has submitted its reports.

The Industrial Commission considers that for administrative purposes the chemists now employed by the State in India, and at present distributed among the cadres of various services, should be brought together into one service to be called the Indian Chemical Service, and should be under the control, so far as their scientific work is concerned, of a senior officer styled Chief Chemist to the Government of India. The remaining members of the service would be divided into three groups—agricultural, mineral and organic chemists—each group being under the supervision of a Deputy Chief Chemist located at a suitable centre. The junior members of the group would be lent to Local Governments and to various Government Departments for periods normally limited to five years; they would carry out the routine duties required, in some cases including teaching, and undertake certain forms of research with the approval of the head of the services. All the members of the Chemical Service would carry on their duties on the following lines: (i) Whenever it is possible to lay down for any officer a programme of research week, such programme would not be sanctioned without the consent of the head of the service: (ii) the head of the Chemical Service would have power to inspect the scientific work of any of his transferred officers or to report thereon to the local authority; (iii) the results of scientific investigations would be reviewed by the head of the service, and would not be published without his consent. Ordinarily, such results would be given their first formal publication in the official journal of the service.

These details will enable men of science in Great Britain to understand how it is proposed that most of the future scientific work in India should be conducted. As soon as the organization of chemists is completed, the Industrial Commission suggests that the botanists, zoologists, and entomologists working in India should be formed into similar centralised services.

The present system under which research is conducted in India may be described shortly as one of decentralisation, the work being carried out at the various university colleges and at a number of independent research institutes under the control of the Government of India, the Local Governments, the Indian States, and trusts, of which latter the Indian

Institute of Science at Bangalore is the chief example. A large number of the most successful investigators working in the universities and at the various research institutes do not favour centralisation in separate scientific services, but consider that the present system should be developed and extended, and that in applied science the bond of union of the workers engaged should be the general subject investigated, such as agriculture or forestry, rather than the particular science involved. At present the investigators dealing with a many sided subject like agriculture are collected at agricultural research institutes, and now belong to the agricultural department. A similar method of organization obtains in forestry and at the centres of medical research like Calcutta and Bombay.

The present system has proved successful in practice, and the value of the work done in India in pure science, in tropical diseases, in agriculture and in forestry has been widely recognised. Decentralisation, therefore, has been justified by success, and a very strong case will have to be made out before the workers at the existing institutes are re-grouped in centralised services under the control, as regards their scientific work, of the proposed Department of Industries of the Government of India.

Increased financial assistance on the part of the State would enable the present universities and research institutes to be developed and more workers secured. With such facilities, there should be the greatest possible freedom for the investigators carrying on original work. The general conditions under which the researches are conducted should be made as attractive as possible, and the policy to be adopted should be one which would secure the very best men available, and the provision of adequate means for their work. For original scientific investigators little or no official control is needed, and they should not be constantly called upon to furnish interim reports and programmes of work to an official chief, or to obtain his formal sanction before undertaking an investigation or publishing the results of their work. Such formalities waste valuable time, lead to constant friction, and are altogether foreign to the spirit which should reign in all centres of creative scientific research.

Briefly stated, the case to be decided is one between the advocates of a system of rigid centralization and those who consider that in research work the man is everything, and that there can be no progress without freedom. Obviously, the conflict of opinion is a fundamental one, and much will depend on the wisdom and sympathies of the Secretary of State, with whom the final word lies, in deciding which policy is to prevail.

ECONOMIC NOTES.

INDUSTRIES AND COMMERCE.

Foreign Trade of Japan in 1919.

The following particulars have been furnished by His Majesty's Commercial Secretary at Yokohama :—

The following is not intended as a critical analysis of Japan's foreign trade for 1919; it is merely a foreword based on the scanty information at present available.

According to a summary of the Foreign Trade of Japan in 1919, published by the Department of Finance, the total trade of Japan proper was yen 4,168,487,000 up to 25th December: exports yen 2,042,258,000, and imports yen 2,126,229,000 showing an unfavourable balance of yen 83,971,000. This is the first adverse balance since the outbreak of the great war.

Exports register an increase of over yen 80,000,000 on the figures for 1918. Imports have advanced yen 458,000,000. The exports and imports of bullion are given as yen 5,054,000 and yen 285,147,000 respectively. This considerable import has practically all come from the United States of America within the last month. The movement of gold last year was, of course, small owing to embargoes in the chief markets of the world.

Trade was dull during the first part of the year owing to the general uncertainty which reigned after the conclusion of hostilities, but showed renewed activity after the Peace Treaty was signed. Another noticeable feature of the year's trade has been the Chinese boycott which started in May as a result of the Shantung deliberations of the Peace Conference, fell off in September from economic causes, and recrudesced in November owing to the Fuchow incident.

EXPORTS.

Shipments to the United States of America and to China have increased considerably in spite of the "boycott" in the latter country, but exports to Europe, Australia, South Africa, and South America, British India, Dutch East Indies, Indo-China, Siam, the Straits, Hongkong, and the Philippine Islands have fallen away materially. This means that Japan has not realised her opportunity and consolidated her position in the many markets which were thrown open to her manufacturers by European inability to compete during the war. She was obsessed by the desire of obtaining

quick and exorbitant profits, and paid too little attention to the quality of her output. Had she adopted a more prudent policy she would probably have been able to maintain her position in such markets, as India, Java, South America, and the Philippine Islands for many years to come.

The increase in experts is due chiefly to the shipment of manufactured goods; foodstuffs, raw materials, and semi-manufactured goods have fallen away. The considerable decrease in the shipment of foodstuffs was due to domestic shortage and decreased requirements of the Allied belligerents and the Chinese boycott. China is normally a large consumer of Japanese provisions. War prosperity in the United States of America is responsible for a very considerable increase in the export of raw silk, which exceeded yen 500,000,000 by the end of November, and showed an increase of over yen 180,000,000 on the figures for 1918. Other exports recording any material advance are cotton cloth, habutæ, matches, cotton underwear, glass, glass-ware, porcelain, braid, toys, woollen cloth.

IMPORTS.

Raw materials are responsible for most of the increase, then semi-manufactured goods and food-stuffs. Manufactured goods show the small advance of 12 per cent. The most striking increases are: raw cotton, rice, wheat, beans, wheat flour, sugar, condensed milk (in spite of recent local expansion), eggs, salt, tanning materials, printing paper, packing paper, iron ore, copper rails, motar cars and parts, electrical machinery, spinning machinery, fertilisers (particularly bean-cake and sulphate of ammonia), and petroleum.

The most noticeable decreases are in hemp and jute, gunnies, and copra (all largely due to the stoppage of war demands) and metals.

Broadly speaking, it may be stated that trade with European neutrals has increased and trade with the allied belligerents in Europe decreased. The reason is obvious. During the war, operations in such countries as Norway, Sweden, Denmark, and Holland were extremely difficult and practically cut off; and now old markets have been reopend and former connections re-established. Again, while hostilities were in progress there was a very strong demand from England, France, and Italy for foodstuffs and military supplies of a direct or indirect nature. This demand rapidly decreased after the signing of the Armistice, and owing to industrial unrest, shortage of supplies, high cost of production, and other causes, Europe has been unable to promote a healthy output of manufactures for this market.

PROSPERITY DUE TO ABNORMAL CONDITIONS.

The economic situation of Japan is pregnant with possibilities of danger. Much has been said and written about the unprecedented prosperity of this country, but it is not clearly recognised that practically all this prosperity is due to abnormal conditions consequent on Japan's peculiar position during the war. The spirit of the nation has not undergone any radical change which would warrant alarm in competitive countries. It is true that Japan has attained a greater measure of independence and that her industries have showed considerable development; but hitherto, uuknown evils, such as labour unrest and fictitiously high cost of living, have arisen as an offset. Added to this, there is a growing mania for speculation and company promoting out of all proportion to the needs of the country; the strong and rapid inflation of the currency has proved an excessive stimulation. Shareholders are improvident in the extreme, and manifest a feverish anxiety to obtain recklessly high dividents at the expense of sound provision for future development.

THE DRYING OF BANANAS.

Dr. W. Burns, Economic Botanist, Bombay, and Mr. P. G. Joshi, Superintendent, Ganeshkhind Botanical Garden, Kirkee, contribute an interesting article on this subject to the current number (Vol. XV, Part II) of the *Agricultural Journal of India.* They describe the preliminary experiments carried out in Bassein, a town on the west coast of the Bombay Presidency, and the difficulties met with. As the result of further experiments at Agashe the authors indicate a simple method of drying, one suitable to the most primitive conditions. If there were an assured market for the product vacuum driers and modern scientific apparatus would be desirable. In the meantime all they wish to show is that by a very simple apparatus a valuable and easily stored food can be made from a perishable fruit. The following is a summary of the experiments:—

"Bananas can be dried at other places than Agashe, and all varieties experimented with can be successfully dried.

Sun heat is sufficient.

Protection from dust and insects is necessary, and some sort of simple apparatus such as that described by us is required.

A good colour can be obtained by using a card-board screen for the last two days of the drying.

The product should be stored in airtight tins or jars and examined periodically, throwing away bad bananas and drying again those likely to have been infected."

Since writing the above, the writers' attention was drawn to an article describing experiments on the drying of bananas in Jamaica. The main conclusions of these experiments of interest to India are:—

(1) The sun-dried product is superior to the product artificially dried in a drying apparatus.

(2) With a good supply of sound fruit at 1*d*. per lb. and a selling price of 6*d*. a lb. a profitable industry could be established in the West Indian islands.

(3) Fruit merchants in the United Kingdom valued the sun-dried bananas at 6*d*. per lb. there wholesale in July 1919.

On 28th August, 1919, a sample of bananas dried in the above manner was sent by the authors to the Chamber of Horticulture, London, for opinion.

That body sent on the sample to a firm of specialists in the banana trade who reported as follows:—

Elders and Fyffes, Limited,
Head Office,
Bow Street,
London, W. C. 2.
14th November, 1919.

Report on Dried Bananas received from the Secretary, Chamber of Horticulture.

"The tin box contained four small parcels, two marked 'Black Colour' and two marked 'Red Colour.' All four parcels are in perfectly good condition and sweet. An outstanding feature is the complete dryness of the fruit, in which it compares favourably with the Jamaican variety. All the fruit is of good flavour.

"The samples marked 'Red' are much brighter and more attractive in appearance than those marked 'Black' and the sample marked 'Red 1' is the best in every respect.

"During the past thirty years many attempts have been made to introduce dried bananas into this country, notably from the Canary Islands, but meeting with poor results the efforts have been short-lived.

"During the war small consignments were imported here from Jamaica and sold readily owing to the scarcity of other dried fruits, but at the present time, notwithstanding the continued shortage, the demand at remunerative prices is negligible.

"It is difficult to speak hopefully of the prospects for the future as it is thought that in normal times the competition of other products of a similar character will be to the disadvantage of the industry."

SERICULTURE.

Japanese Silk Trade in 1919.

Japan's export trade in silk manufacture during 1919 presented unusual activity, although the first half year was dull consequent upon a reactionary depreciation that followed the prosperous export during the war period:—

This was especially the case with the exportation of "chirimen," "kabeori," and other special kinds of silk textiles. Since the middle of the first half-year the demand for Japanese silk textile fabrics gradually increased in the United States, Canada, Australia, and India. On the other hand, the export to Europe considerably decreased owing to the continued depreciation of exchange, which hit the export trade of the empire with Europe all the time. The remarkable increase of the exports to North America, states the "Yokohama Chamber of Commerce Journal," more than compensated for the loss incurred on account of the decrease of exports to European countries, and, moreover, the sudden rise in the market price of silk yarns, which ruled very strong throughout the year, added to the almost unprecedented figures for the particular line of Japan's export trade for the year.

The export market witnessed no such marked fluctuations in market quotations as to disturb the market. Moreover, the continued high prices of silk yarns favourably affected the market prices of silk manufacture, which also ruled very strong throughout the year.

Especially active was the tone of habutaye market. Under the favourable circumstances the plain habutaye, which was quoted at about 15 yen per 100 momme about January and February, went up to about 35 yen about the middle of November, the highest figure ever recorded.

EXPORT OUTLOOK FOR 1920.

The outlook for the export trade is hopeful, with every prospect of further increase this year because of the labour troubles in America and other countries.

With prosperous exports and high prices the staple industry attained a remarkable development during the year, this being especially the case in Ishikawa and Fukui prefectures, the important centre of habutaye industry. In Fukui prefecture the production was something like between 40,000 and 65,000 rolls in the first four months of the year, but increased to over 100,000 rolls in July and August

In Ishikava prefecture the increase was similarly notable, the figure swelling from about 50,000 rolls each in February and March to between 80,000 and 90,000 rolls each in September and October.

The export trade in silk manufacture, with habutaye as the most important item, reached its height during last summer and autumn, and, together with the continued advance of prices enhanced by the active exportation, the value of the exports reached an enormous figure. The total exports of habutaye for the eleven months ending 30th November amounted to 75,868,470 yen, these figures representing the shipments through the port of Yokohama only. Figures for the same period of other silk manufactures are 20,783,143 yen of "chirimen" silk, 21,609,188 yen of other silk textile fabrics, and 6,080,854 yen of silk handkerchiefs, making a total of 124,341,430 yen, showing an increase of 23,655,430 yen over the similar figure for the same period of the previous year.

SILK FARM AT BOWRINGPET.

The following is the Rearing Report of the Demonstration Farm at Bowringpet during March and April, 1920 :—

Till very recently there was no mulberry cultivation in Bowringpet Taluk and many attempts were made to find one or two men at least who would take up the cultivation with interest. Though many persons expressed willingness to take up Sericulture, yet there was some diffidence but no one was willing about taking the initiative, and every one wanted some one else to begin, to show the way. During the last two Taluk Conferences it was explained that with ordinary care there was really no risk of failure or loss.

At last Mr. Namberumal Chettiar of Bowringpet, a Toddy contractor came forward and planted nearly ½ an acre near Bowringpet Town with mulberry in the month of January 1920; this area was increased in the next month by one acre. The plants came up well as the care given to the garden was quite satisfactory. Mr. Chattiar had no previous experience of the silk worm rearing and the spinning lasted for two days.

The rearing operations attracted a large number of visitors, and considerable interest centred round this the first brood of silk worms reared in Bowringpet. Many people now wish to take up silk worm rearing.

Some worms died of grasserie in the last stage on account of high temperature and immaturity of leaves.

The total yield of the crop for 50 layings is 22 lbs. weighed on the 5th day and the Cocoons were fairly good. In spite of the unfavourable weather throughout the rearing period, the rearing was a successful one.

Mr. Namberumal Chettiar wishes to construct a separate rearing room, and will, it is believed complete it early, as he is keen about enlarging his operations, and conduct them on a commercial basis.

The Cocoons though well spun were not strong as the leaves used were of the first crop after planting.

The leaves were not at all well matured and nutritious. After the first pruning there is no doubt he requested the Department to arrange to conduct a rearing for him in a house which he placed at our disposal.

We responded by lending rearing appliances from Kolar, and deputing Practitioner Venkata Rao to work at Bowringpet and conduct the rearing for Mr. Chettiar. A rearing was started with 50 layings of the Mysore race and the worms hatched out on 29th March 1920.

The temporary rearing room was a tiled roofed one which used to get very hot in the day and the temperature during the rearing period ranged between 75° F—92° F. This had to be used, as no better room was available. Attempts were made to moderate the temperature, and secure the necessary humidity by a frequent and copious sprinkling with water.

The worms were coming up well and passed the successive moults regularly and were quite healthy and vigorous. Daily the worms were fed 12 times till the III moult, after which, the feedings were reduced to 10; six in the day and 4 in the nights. The worms began to spin on the 28th day after hatching about the leaves being suitable for the good development of the worms.

Out of the total yield of Cocoons nearly 1,500 were kept for seed to see the healthy state of the moths and the rest was stifled for being reeled. He is waiting for the rains after which he wants to take up cultivation for another two acres. The next rearing will be taken up during the month of June 1920, by which time there will be enough leaves to rear another brood.

Practitioner Venkata Rao worked throughout the rearing well, and the success is due to his earnestness. He has also shown the improved methods of rearing under the Hygienic conditions to the workmen of Namberumal Chettiar.

MYSORE ECONOMIC CONFERENCE.

BOARD OF AGRICULTURE.

The following is a brief report of work done by the Board of Agriculture during the months of January, February and March 1920.

INTRODUCTORY.

In accordance with the terms of Government Order No. 514-86 E. C. 15—19—2, dated 19th July 1919, the Agricultural Committee was reconstituted into the 'Board of Agriculture' with 22 members for the calendar year 1920.

Two meetings of the Board were held—one in January, and the other in March.

Three members were elected for the Economic Development Board for the current year, and the budget estimates for the year, 1920-21 were also framed and submitted to Government for sanction.

PROGRAMME.

A programme for the remaining items was prepared and the following Sub-Committees were constituted to deal with each group :—

(1) Increase of food production and expansion of cultivation.
(2) Sanctioning takavi loans to ryots for house-building on approved lines.
(3) Development of sugar-cane cultivation.
(4) Development of agricultural co-operation.
(5) Experimental work in coffee selection.

During the period under report, the first three Sub-Committees met and their recommendations were investigated, necessary action being also taken.

The other items of work on the Programme were dealt with individually.

INCREASE OF FOOD PRODUCTION.

Consolidation of scattered holdings :—The Board thought that before the consolidation of scattered holdings was taken up in settled areas, experiments should be carried out in new areas set apart from Amrit Mahal Kavals after the constitution of economic holdings. It should be a condition of such experiments that no further sub-division of holdings so formed should be made.

Settlement of criminal tribes :—An outline scheme for the formation of a Criminal Settlement in the State, drawn up by the Secretary and approved, with certain modifications by the Board was submitted to Government. The scheme recommended the formation of a settlement for such tribes within the State with a view to settling them to peaceful occupations and was estimated to cost about Rs. 43,000.

Regulating prices of food grains :—The Board, while unanimously agreeing to the necessity for prohibiting the export of food stuffs, were not in favour of controlling the prices of food grains.

COMMERCIAL CROPS.

Supply of manure to Sugar-cane Growers' Associations :—The Board agreed with the Sub-Committee for the Development of Sugar-cane Cultivation that an allotment of Rs. 50,000 be made in the next year's budget of the Agricultural Department for the purchase and distribution of oil-cake to sugar-cane growers.

Development of sugar-cane cultivation.—The Board recommend the grant of the following concessions by Government in cases where individuals, Co-operative Societies, or Joint-stock Companies wish to establish jaggery manufacturing plants :—

(1) The deputation of an experienced Mechanic from the Department of Industries to look after and work the machinery and also of an Officer of the Agricultural Department to supervise the making of jaggery.
(2) The salary of the Officers may be met by Government and this concession may be shown for a period of one year. These officers may be made to work under the individuals or the Joint-stock Companies or the Co-operative Societies concerned.

Creation of facilities to Joint-stock Companies to establish sugar-cane plantations on a large scale in places where canal-irrigation is available:—The Board resolved to defer the consideration of this subject till the evidence recorded in the State by the Indian Sugar Committee was printed and circulated, and further decided to get the above evidence translated into Kannada and printed at their cost.

Creation of facilities for Tea cultivation :—A set of revised rules for the grant of lands for tea cultivation was framed and adopted, with a view to induce capitalists to take to this cultivation.

LIVE STOCK.

The Sheep Farm at Gottigere, Bangalore Taluk, which was in charge of the Board, was transferred to the control of the Agricultural Department as an Expert in Animal Husbandry was appointed by Government to work under the Director of Agriculture.

At the time of the transfer of the Farm *viz.*, 6th February 1920, there were 137 sheep on the Farm, consisting of valuable Merina and Dumba hybrids and country ewes.

HORTICULTURE.

As recommended by the Board, Government sanctioned loans of Rs. 1,000, and Rs. 2,000 to Messrs. Basappa of Holehanasvadi and Tenginakere Subramanya Bhatta of Tirthahalli, respectively, for raising nurseries of fruit plants and development of fruit cultivation.

The appointment of a Chief Horticultural Inspector was filled up in March. This Inspector is in charge of Bangalore District also.

COLLECTING AND SPREADING OF INFORMATION.

The Board approved of the publication of a brochure in Kannada on 'Arboriculture' prepared by the Conservator of Forests.

BOARD OF EDUCATION.

The following is a brief report of work done during March, 1920.

EDUCATION OF DEPRESSD CLASSES.

I. The Sub-Committee for the Education of Depressed Classes met on 24th March 1920, and passed resolutions to give scholarships to supply slates, books and other school requisites at Government cost, to open Boarding Homes, and to earmark a certain portion of cultivable land for the depressed classes. They also resolved that a special Trust Officer with the status of the Head of a Department with a special grant of one lakh of rupees was also necessary.

PHYSICAL EDUCATION.

II The Sub-Committee for Physical Education also met on 24th March 1920, and resolved to have an American Expert and to send the instructor of the Physical Culture Institute to America to learn western systems of Physical Culture with a view to appoint him as Director of Physical Culture later on.

MEETING OF THE BOARD OF EDUCATION.

III. The Board met on 27th March 1920, and discussed a few of the subjects on the agenda, *viz.*, (1) continuance of the services of the Itinerant Lecturers, (2) Forms of Grants-in-aid, (3) Abolition of special vacation classes for training teachers of primary schools, and (4) Review of Kannada books available in the market.

The Board also elected Mr. M. Subbiah to fill up the vacancy on the Central Economic Development Board caused by the death of Mr. Basavaiya.

(Sd.) K. SRINARASIMHAIYA,
Secretary, Board of Education.

SHOWS AND EXHIBITIONS.

Cattle Show at Mudakatore.

In connection with the *Jatra* of Sri Mallikarjuna Swamy of Bettahalli, T. Narasipur Taluk, a Cattle Show was held at Mudakatore. The Show commenced on the 30th Jan. 1920, and continued upto 3rd February. There were 12,500 heads of cattle and a committee of ten gentlemen was formed to select cattle eligible for the award of prizes. Prizes in the shape of money and certificates were distributed by the Sub-Division Officer, Mr. T. Venkataramiah, B.A., to the owners of deserving cattle. His Highness the Maharaja of Mysore was pleased to pay a visit to the place on the 1st Feb. 1920.

QUERIES.

Hints to Correspondents.

Write on one side of the paper only. (2) Write each query on a separate sheet of paper. This will facilitate answering questions as in many cases they may have to be referred to experts. Put your name and address down on every such sheet. No attention will be paid to unsigned queries. (3) Drawings for illustrations should be on separate sheets of paper. They must be made in black ink only on white paper—*not in pencil or colour*—and twice the size they are intended to appear, especially reference, letters and figures. (4) Put titles to queries, and, when answering queries, put the number as well as the titles of the queries to which the replies refer. (5) No charge is made for inserting letters, queries, or replies. (6) Letters or queries asking for addresses of manufacturers or correspondents, or where tools or other articles can be purchased, or replies giving such information, cannot be inserted except as advertisements. No question is answered through the post. (7) Letters sent by correspondents, under cover to the Editor, are not forwarded and the names of correspondents are not given to inquirers. (8) As the space devoted to queries and replies is limited, they should be drawn up as briefly as possible. (9) To facilitate reference, correspondents, when referring to any letters previously inserted, should mention the number of the letter, as well as the page on which it appears. (10) All communications should be addressed to the Editor, *Mysore Economic Journal,* "Ringwood," Bangalore.

Reply.—Some time ago there appeared in this *Journal* a suggestion from Mr. S. G. Shastri to the effect that he wanted to conduct an experiment on rubber-seed.

Experiments in Europe and elsewhere have been recently performed and it has been found that the oil extraated from rubber-seed has been a satisfactory substitue for linseed oil in the manufactures of Paints, varnishes, linoleum, soap and other articles. It is also asserted that the cake can effectually be fodder to cattle and other live-stock.

The only fact in this respect to be ascertained is its comparitive economical value to that of linseed, which is in abundance.

BOOKS IN BRIEF.

Comparative Education—*Edited by Peter Sandiford, M. A., Associate Professor of Education, University of Toronto. Messrs, J. M. Dent & Sons Ltd., Bedford Street, Landon, W. C. 2. Price 8sh. 6d.*

Too much praise cannot be given to this book. It is a survey of the Educational systems in each of six representative countries—United States, Germany, England, France, Canada, and Denmark. Each system is examined by a specialist in education and his views are set forth in clear and succinct fashion. In each an attempt is made to explain educational principles and tendencies in terms of social, economic, and political antecedents of each country under consideration. Each country has been chosen with a definite end in view. So much has been said of Education and educational progress in this country in recent times that it is hardly necessary to insist on greater knowledge on the part of those who wish to take part in discussions relating to education. Comparative studies of the kind now published under the editorshipof Professor Sandiford ought to go a long way in making it easy for would-be educational debaters to know the conditions under which educational advancement is really possible. A useful corrective to ardent, if not radical, reformers would be the study of a volume like this in which are set out the factors which determine the character of the educational institutions of a country. Professor Sandiford deserves to be complimented on this latest work of his and the excellent manner in which it has been executed. Messrs. Dent, the publishers, deserve also to be thanked for this timely publication. We would commend the book to the attention of all interested in educational progress in India.

Personal Hygiene.—*By M. R. Samey, M.D., D.P.H., M.O.H., University Professor Emeritus of Hygiene. Messrs. Butterworth & Co., Calcutta & London.*

This is an excellent little book on the subject to which it relates. The publishers in their note rightly observe :—"Ideals of cleanliness of body, home surroundings, of village, town and city, are quite constantly enough held up before individuals as well as civic authorities but they are almost always pitched too high and hopelessly ignore the incidents of Indian Social life. High ideals, not accompanied by near practical aims and suitable methods of realization, are apt to be petrified into mere academic knowledge or blind worship of ideals not serving as motive power for life and action." These words fully indicate the objects and scope of the book. Dr. Samey is, as may be expected from one of his knowledge and experience, thoroughly practical in his views. He knows too well the people he addresses himself to and so is never found to be committing the commen error of putting forward impracticable ideals before them. His hints and suggestions are couched in simple and intelligible language, so that everybody can understand and follow them in daily practice. We would like the book translated freely into the leading vernaculars of the country. It is only then its real worth will be appreciated. We would note before concluding that the contents of this book were originally published in the *Madras Local Self-Government Gazette* and have been reprinted from it.

The State in Peace and War.—*By John Watson, LLD., Litt. D., D.D., Professor of Moral Philosophy in Queen's University, Kingston, Canada. Messrs. James Maclehose & Sons, Publishers to the University, Glasgow. Price 7sh. 6d.*

We do not think that we can better state the scope and objects of this book than in the words of its author. The following paragarapb from his preface sums these thus:—"In the following pages an attempt has been made to follow the evolution of political ideas from the origin of the City State to the rise of the modern Nation-State, and to give a concise statement of what seems to me to be the true principle of the latter. I have attempted to guard this principle from misconception, and specially to indicate the intimate relation of the State to the various subordinate organizations which it includes and which are essential to its perfection as well as its relation to foreign states and to the world at large. To this has been added a short statement of the regulations of civilized warfare, a reference to the character of the British Empire, and a consideration of the proposals for a League of Nations. I have in the main avoided all reference to the present war, contenting myself with indicating the opposing conceptions of England and Germany." Dr. Watson's study of the development of political theory is a fascinating one. Nor could it be well otherwise when we note to whom he owes his cardinal ideas—Green, Bosauquet and Caird. His analysis of the Modern State (Chapter IX) deserves special attention in these days. Equally important is his chapter (X) on System of Rights. In it are discussed some topics of supreme interest all the world over just now. The bibliography at the end of the book is a most helpful one. We should be glad to see the book attract the attention that it deserves both from the universities and the general public which is not content with the altogether ephemeral literature of the kind that now circulates in this country.

The Meaning of Reconstruction by Demos—*Published by George Allen and Unwin Ltd. Ruskin House, 40. Museum St. London. W.C. 1.*

"Demos," whoever be is, has produced a thought-provoking piece of work in this booklet of essays originally contributed to the *Athenaeum*. In it he considers the real purpose of reconstruction and some of its implications. He regards the devolopment of human history as a history of conflict between Liberty and Authority. The war itself he regards as a part of this re-construction. He suggests that reconstruction should take note of the fact that this increasing struggle between Liberty and Authority will go on despite the cessation of war. No Reconstruction will be possible or feasible if it does not take note of this cardinal fact. He would base Reconstruction on Liberty. A policy based on Liberty would, in his opinion, mean a democratic policy, for liberty and democracy are twin principles. He puts his central idea thus: "Once we are clear that the goal is to make all men free rather than some men rich or to make all nations free rather than some nations great, we have an end towards which our steps can be deliberately directed, to the confusion of militarists, chauvinists and materialists, whose success in the past has been due to the lack of a sufficiently coherent ideal and policy embodying the principles of justice and freedom. Certainly a book to read and ponder.

Coconut, Kernels, Cocao Planting, Cultivation, Expression, etc.—*By Cap. A. O. Newland, F.R. Aist. S., F.I.D., etc., Messrs. Charles Griffin & Co. Ltd., Exeter Street, Strand London W. E. 2. price 6sh. net.*

This is an excellent practical hand-book—one of Messrs. Griffins well-known Technological Handbooks, on the planting, cultivation and expression of coconuts, kernels and cocao for the use of planters, financiers, scientists and other. Incidentally Cap. Newland, the author shows the resourses which the British Empire has in regard to the supply of oils and fats. Greater exploitation is what is desired by him. His remarks on the value of the African possessions of Germany are both shrewd and informing. Those who desire for the latest information on the subject of the planting and expression of coconuts would do well to consult this book. The illustrations contained in it greatly add to its value. We heartily commend it to those interested in coconut planting in India.

An Empire Builder of the XVI Century—*By L. F. Rushbrooke Williams, B.A., B. Litt., F.R. Hist. S., etc., Professor of Modern Indian History, Allahabad University. Messrs Longmans Green & Co., London, Bombay and Madras.*

In this book Professor Williams draws a very pleasing picture of Babar. Of all the Moghals, Babar was perhaps the most adventurous, brave and manly. Professor Williams styles him a very gallant gentleman and so he was. The picture is well drawn, the lineaments are discernable and there are, so far as we have been able to make out, no faults to be seen in it. The labour and scholarship brought to bear on the work has thus been amply repaid—so at least we should think from the reader's point of view. Professor Williams has shown how research work in modern Indian history has to be undertaken, both the spirit and the manner of it. We should like to see the book widely read by students intending to make research work their life's occupation. Such students are, we are glad to note, on the increase and it is particularly necessary that they should start on right lines. Here is a book that will enable them to do that; it is more eloquent than dry lectures on "methods" in research work. We have read Professor Williams' introduction to the book in which he sketches the politics of India at the time of Moghul invasion. We think the sketch is an excellent one but it might, when a next edition is called for, as it will doubtless be before very long—be easily made less amateurish in its treatment of Vijayanagar kings. "Bakka" (on page 6) we take it is Bukka. Professor Williams relies for his material for this part of his introduction on Abd-ur-razzak's well-known account of the Hindu Kingdom. But so much light has been thrown on Vijayanagar Kings and Kingdom within the past twenty years or so that there is hardly any excuse for even Bukka appearing in a book of this sort as "Bakka." We write this solely with a view to enable Professor Williams to set right small blemishes of this kind which go to mar an otherwise excellent book.

Corporate Life in Ancient India.—*By R. C. Majumdar, Lecturer in Ancient Indian History, Calcutta University. Published by Surendranath Son, Kamala Printing Works, 3, Kashi Mitter's ghaut street, Calcutta. Price Rs. 4.*

Very high praise is due to the author of this unpretentious book. Mr. Majumdar has brought together here much valuable material on an obscure but much debated subject of ancient Indian life. We think he has stated his case with admirable self-restraint, that great trait of a good scholar. He has exploited his subject with care and has laid under contribution practically every source of information available. He has, moreover, fixed his attention on one single point and has not wavered from the path of strict historical research. It is a good sign of the times that scholars of this type are growing in this country. We think that Mr. Majumdar's work will be followed by many others of its kind on the many obscure points still awaiting research.

ACKNOWLEDGMENTS.

The Coming Great Change in Education.—*Lecture by Captain J. W. Petavel, Principal, Maharajah Kassimbazar's Polytechnic Institute, Calcutta, at the Mysore Dasara Exhibition, 1919. Bulletin No. I. Board of Industries and Commerce, Mysore 1920.*